The OIL AND GAS JOURNAL

Field proven over 15 years

THE SECURITY C-B BIT

THE STRAIGHT HOLE BIT

THE SECURITY C-B Bit is designed for straight hole digging. The high-center cone in all types gives the bit extraordinary stabilization. Skillfully applied hard-facing insures full gauge hole. Rightly designed in both spiral cone and straight tooth types, the body is streamlined for less weight. Controlled circulation nozzles keep the hole clean and the cutters free from balling up.

The bit illustrated is a Type "OS" for softer formations, red bed, salt, chalk and sticky shale. A range of other types, "OAW", "OW", "C", "CF" and "CFF" give fastest going in the harder formations.

Security ROCK CB BITS

Made in a plant devoted exclusively to the manufacture of Rock Bits.

SECURITY ENGINEERING CO., INC.

Main Office & Plants, Whittier, California

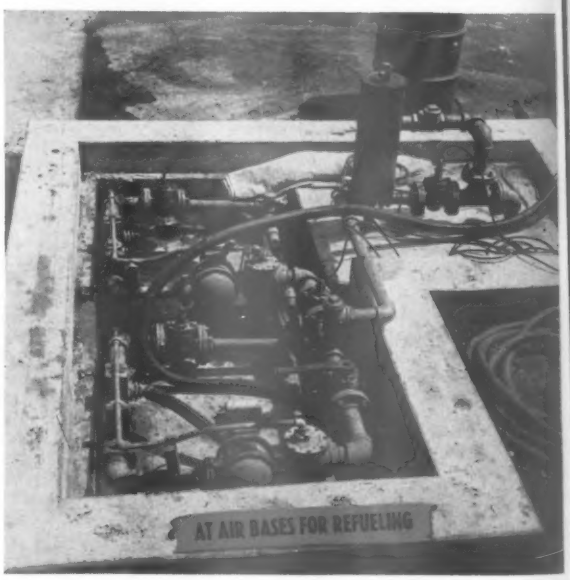
EXPORT OFFICES NEW YORK SAN FRANCISCO IN CANADA SECURITY ENG CO LTD CALGARY ALTA

Branches in All Principal Oil Fields

PRICE 20 CENTS

JUNE 30, 1945

SERVING BATTLEFRONTS THROUGH NORDSTROMS



Now Available
Nordcoseal Lubricant
No. DC 234-S
A DOW CORNING SILICONE PRODUCT

*Trade Mark

Nordstrom
LUBRICATED VALVES

MERCO NORDSTROM VALVE CO.
A Subsidiary of Pittsburgh Equitable Meter Co.
Main Offices: 400 Lexington Avenue, Pittsburgh 8, Penna.
Branches: Atlanta, Boston, Chicago, Houston, Kansas City, Los Angeles, New York, Oakland, San Francisco, Seattle, Tulsa

the OIL AND GAS JOURNAL

published weekly by the

PETROLEUM PUBLISHING COMPANY

211 S. CHEYENNE AVE., TULSA 1, OKLAHOMA

Subscription rate to the petroleum industry, United States and foreign, 1 year, $6.00; 2 years, $10.00; 3 years, $12.00; 5 years, $15.00. Single copies, 20 cents. Back copies, when over a year old, 50 cents. Entered as second-class mail matter at Tulsa, Okla., under Act of March 3, 1879.

Copyright 1945, by The Petroleum Publishing Co.

Vol. 44, No. 8 June 30, 1945

P. C. LAUINGER, *President* — C. O. WILLSON, *Editor*

S. H. ROURKE, *Business Manager* — H. STANLEY NORMAN, *Managing Editor*

R. C. MAC DOUGALL, *Circulation Manager* — ARCH L. FOSTER, *Refining Editor*

W. L. NELSON, *Technical Editor* — PAUL REED, *Pipe-Line Editor*

Associate Editors

LYNN M. NICHOLS — NEIL WILLIAMS

CHARLES J. DEEGAN — KENNETH B. BARNES

R. B. TUTTLE

District Editors

JAMES McINTYRE, Tulsa 1, 211 S. Cheyenne Ave. — THOMAS F. SMILEY, Tulsa 1, 211 S. Cheyenne Ave.

TOLBERT R. INGRAM, Denver 2, State Office Bldg. — E. H. SHORT, JR., Houston 2, Sterling Bldg.

HENRY D. RALPH, Washington 4, Natl. Press Bldg. — L. P. STOCKMAN, Los Angeles 14, Union Oil Bldg.

A. C. MacINTYRE, Oil City, Derrick Bldg. — O. C. PRESSPRICH, Saginaw, News Bldg.

VICTOR LAURISTON, Chatham, Ont., 35 Stanley Ave. — FABIAN R. STALEY, New York 17, 415 Lexington

Advertising

E. KLAPPENBACH, *Vice President*

KENNETH J. LANGLEY, *Eastern Manager*, New York 17, 415 Lexington Ave. — CRAIG ESPY, *Pittsburgh Manager*, Pittsburgh 19, Grant Bldg.

C. R. FARMER, *Chicago Manager*, Chicago 2, 105 W. Madison — J. HOWARD TINKHAM, *California Manager*, Los Angeles 14, 1400 S. Grand Ave.

WAYNE RIVES, *Gulf Coast Manager*, Houston 2, Sterling Bldg. — A. J. CHAMBERS, Beckenham, Kent, England, 33, The Avenue

MITCHELL TUCKER, *Manager, Research Dept.*, Tulsa 1, 211 S. Cheyenne Ave. — JOHN D. REILLY, *Production Manager*, Tulsa 1, 211 S. Cheyenne Ave.

Member
Audit Bureau of Circulations
Associated Business Papers

Table of Contents

NEWS DEVELOPMENTS

Witnesses at O'Mahoney Hearing Plead for Removal of Controls 76
Capture of German Records Will Boost U. S. Synthetic Fuel 78
PAW Calls for All-Time High in Oil Production 80
Decision Reserved in Patents Case 80
Verbal Clashes Mark Tideland Oil Hearing 81
Ickes Declares Resignation Not Accepted 81
What Others Say 82
International News 84
Crude-Oil Ceilings Raised by OPA in Six States 87
PAW Has 144 Requests for Hugoton Drilling Permits 87

Trends 75
This Week 79
Editorial 83
Deaths in the Industry 88
Natural-Gas News 132
Natural-Gasoline News 132
Refining News 134
Pipe-Line News 137

ENGINEERING AND OPERATING

Maljamar Project Covers Many Operational Phases 90
Problems in Cutting and Fishing Below 13,000 Feet 98
Penetron Quickly Determines Steel Thickness 106
Ruptured Pipe Lines—Preventative Maintenance 120
Secondary Recovery in Nowata-Claggett Field 127

Questions on Technology 117
Front Lines in Refining 126
The Refiner's Notebook 129
Eng. Fundamentals 131

EXPLORATION AND DRILLING

Week's Highlights 141
Weekly Well-Completion Record 141
Daily Average Production for Week 142
Reports by Areas Start on Page 142

ADDITIONAL FEATURES

Drilling Contractors 156
Market Summary 157
Crude-Oil Prices 157
Personals 158
Events on the Calendar 159
Men in Equipment News 160
Classified Advertising 161
Advertisers' Index 164

Call it what you like
CORE EXTRACTOR or TESTING PUMP

It has dozens of uses in both field and shop

The Baker Hydraulic Core Extractor and Testing Pump is a strong, simply constructed light-weight unit capable of developing pressures up to 6,000 pounds, without undue exertion.

Originally designed for removing cores from core barrels, many other oil field and shop uses have been discovered and it is today widely used as a testing pump; for removing plungers from insert liner oil well pumps; for testing valves, fittings, casing and tubing; and for setting Baker Cement Retainers when mud or cement pumps are not available.

LOW OR HIGH PRESSURE

The Baker Hydraulic Core Extractor has two pistons, one for low pressures and one for high pressures, the change being quickly made by merely moving the pressure shifter to engage the proper lugs for pressure desired.

LASTS INDEFINITELY WITHOUT REPAIRS

Simple, rugged construction insures long, trouble-free service, and by pumping clear water (or water containing soluble oil) through the unit after use, the essential working parts always function properly and seldom require replacement.

The Baker Hydraulic Core Extractor and Testing Pump is identified as Product No. 540, and is described in detail on Page 374 of the 1944 Baker (or Composite) Catalog.

BAKER OIL TOOLS, INC.

Houston—LOS ANGELES—New York

The BAKER Hydraulic

CORE EXTRACTOR AND TESTING PUMP PRODUCT NO. 540

the OIL AND GAS JOURNAL

Trends

Crude-Oil Production
By States—Page 142

CRUDE-OIL STOCKS 221,922,000 bbl. as of June 16—up 370,000 bbl. One year ago 230,565,000 bbl.

GASOLINE STOCKS 87,504,000 bbl. as of June 16—down 392,000 bbl. One year ago 84,325,000 bbl.

RESIDUAL FUEL-OIL STOCKS 39,482,000 bbl. as of June 16—up 486,000 bbl. One year ago 52,668,000 bbl.

GAS OIL AND DISTILLATE STOCKS 30,397,000 bbl. as of June 16—up 58,000 bbl. One year ago 34,079,000 bbl.

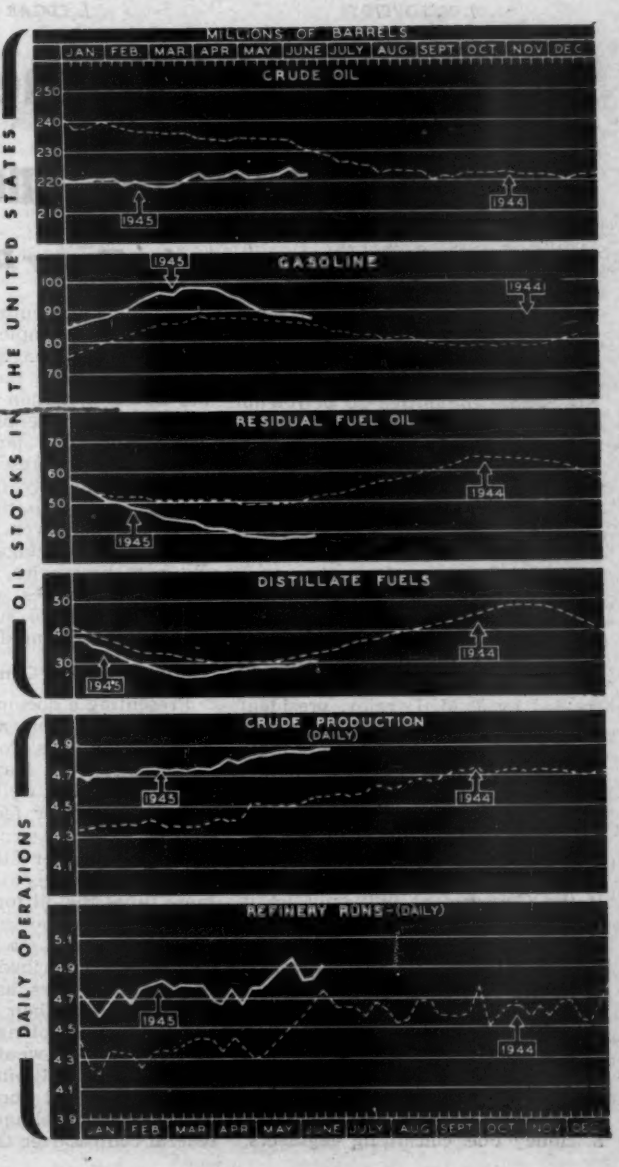
CRUDE-OIL PRODUCTION 4,894,650 bbl. as of June 23—up 12,400 bbl. One year ago 4,584,370 bbl.

REFINERY RUNS 4,915,000 bbl. daily week ended June 16—up 88,000 bbl. One year ago 4,741,000 bbl.

AUTHORIZATION for manufacture of 691,000 new automobiles during the next 9 months represents only a minute part of the demand backlog built up in 3½ years of war. From the petroleum industry's standpoint, however, the gradual return of automobile manufacturing facilities to civilian production means considerably more than the bare number of new cars. It means that the suppressed inclinations of the American public to drive whenever and wherever fancy dictates may be released sooner than expected. Furthermore, the 9-month production schedule projected to June 30, 1946, may be accelerated during the last three quarters of the year. It is entirely possible that approximately 3,200,000 new cars may be produced between now and the end of next year and that adequate gasoline and tires will be available for operation at rates optional with drivers.

MECHANICALLY, new automobiles will be changed little from the last prewar models. Manufacturers would be unwise, it is felt, to build engines for 1945 and 1946 models fully qualified to operate on superior fuels which will become standard after Japan is defeated. Civilian motorists were told this week that military demands will prevent improvement in quality of gasoline for the indefinite future. This means that advancements in refinery technology will lag in translation to civilian-product quality until the Japanese surrender is complete. Interim conditions both in mechanical qualifications of cars and in quality of motor fuel are incidental.

EMPHASIS by the petroleum administration and the refining branch of the industry has been converted in the 6 weeks since Germany's surrender to maximum production of distillate and residual fuel oils. Weakness in the petroleum supply picture, consequently, has shifted from gasoline to fuel products and shortages next winter will be most acute in the latter. In order to prevent accumulation of top-heavy inventories of regular motor fuel it seems inevitable that civilian motorists will be permitted to absorb the surplus. In this connection, new automobiles and their effect of filtering better used cars into hands of less-essential drivers will play an important part in the immediate and postwar economy of the petroleum industry.



J. M. LOVEJOY

J. EDGAR PEW

M. G. CHENEY

Witnesses at O'Mahoney Hearing Plead for Removal of Controls and Federal Competition

by Henry D. Ralph

WASHINGTON.—A general seminar on interesting aspects of the oil industry of the world, past, present, and future, being conducted by the Senate committee on petroleum resources last week covered such topics as oil and gas reserves, public land lease and royalty terms, government competition, crude-oil prices, taxation, federal land ownership, the Interstate Oil Compact, Naval petroleum reserves, unitized production plans, well spacing, German synthetic plants, and the possibility of drilling for oil in the middle of the ocean.

Industry witnesses, appearing as members of a special committee headed by J. M. Lovejoy, president of Seaboard Oil Co. of Delaware, used every opportunity to press home the arguments that the nation is not running out of oil, that conservation and technology are increasing steadily, and that the industry can provide ample supplies of cheap liquid fuel for peace or war if the Government will only let it alone, remove senseless controls, stop competing with it, and drop the idea that natural resources must be locked up and hoarded.

After oil reserves had been discussed in detail by J. Edgar Pew, vice president of Sun Oil Co., and M. G. Cheney, president of Anzac Oil Corp., the natural-gas situation was presented by E. DeGolyer and E. Holley Poe, consulting engineers.

DeGolyer presented the results of a survey just completed by his firm which showed that proved reserves of natural gas in the United States are now 140 trillion cubic feet, and total reserves are probably around 200 trillion. He pointed out that estimates of gas reserves have been increasing steadily for many years and reasoned that there is no need to be alarmed over the prospect of an early gas shortage. Deeper drilling, new discoveries, and better conservation practices will further increase the usable supplies of natural gas, he declared.

States Handling Conservation Well

Presenting a document on the history and development of state gas-conservation laws, Poe declared that conservation is a local problem and is being handled well by the states, with no need for federal intervention.

State oil-conservation laws have made it possible to supply many more times the oil for this war than during the last one, said J. C. Hunter of Mid-Continent Oil and Gas Association. He described the operation of proration laws and other state regulations and their results in conservation and prolonging the life of oil fields, and he went into considerable detail in outlining the work of the Interstate Oil Compact Commission. Complete relinquishment of all federal control over the industry, he said, will permit the industry and the oil-producing states to continue this conservation work, adding:

"The engagement of the federal Government in the oil industry, either directly or indirectly, is fraught with the inevitable waste of public funds, gross inefficiency in every phase of business, and the certain demoralization of a vital industry that has met every demand upon it and, unharassed and unhampered, will so continue."

M. L. Haider, research engineer of Standard Oil Co. of New Jersey, described to the committee the increase in knowledge of oil structures, nature of an oil reservoir, ultimate recovery, reservoir energy, gas drive, water drive, bottom-hole pressure, pressure maintenance, maximum efficient rate of production, unitization, well spacing, condensate fields, prevention of waste, utilization of casinghead gas, and similar technological developments which have prolonged the life of fields and increased our reserves. These practices have been fostered by state conservation laws but rest less on compulsion than on a genuine desire of the industry to improve the efficiency of its operations, he said, and such technological progress can be continued only under the free competitive system.

Summing up this phase of the testimony, Lovejoy told the committee that while great progress has been

M. L. HAIDER

W. S. HALLANAN

A. C. MATTEI

made in conservation and utilization, the rate of discovery of new fields is declining, and that inept policies of the federal Government are in large measure responsible for this.

"The attitude of Government to the particular problems of any industry is one of the most important factors with respect to the development of that industry," Lovejoy said. He defined the proper role of government to be making and enforcing rules of fair play and good conduct in business, but deplored the tendency of the federal Government to go beyond this.

"There is evidence," he said, "that some individuals in Government feel that there should be a Government-industry partnership for the future. Such is incompatible with our concept of constitutional government. It is a well-known principle that when government moves in, industry and business move out. No business or industry, however strong or however sound its economy may be, can long withstand the heavy hand of government management or government competition. The United States Government was not designed as a business or industrial enterprise but, rather, as the guardian of individual rights and the proprietor of the freedom of enterprise."

Among government attempts to enter the oil business Lovejoy cited Petroleum Reserves Corp., the Army's Canol project, Naval petroleum reserves, and proposals for disposition of surplus property.

Taxation as a factor affecting exploration and production were discussed by F. B. Plank, of Cities Service Oil Co., who stressed particularly that the oil industry must have a consistent tax policy on the part of the Government and also one which gives due consideration to the peculiar risks and hazards of finding oil. He explained the importance of retaining present provisions such as the percentage depletion allowance and deduction of intangible development costs. Plank particularly attacked the growing policy of the Bureau of Internal Revenue to use all discretionary powers to make rulings against taxpayers and to apply these rulings retroactively to prior years. Without a sound and stable tax policy, he said, the oil industry cannot undertake the risks required in the exploration and development of new fields.

Reason for U. S. Supremacy

Walter S. Hallanan, president of Plymouth Oil Co., said that the only reason the United States has been able to produce so much more oil than any other part of the globe is that up to now we have had a system of government which did not hamper private enterprise and initiative nor impede intelligent economic progress. "The record of world-wide petroleum production can be examined, dissected, weighed, and measured, and no other conclusion can be reached. So long as it is possible for us to maintain that governmental attitude we shall have necessary production of petroleum products in this country. The minute we abandon it the development of our petroleum resources will begin to fail."

The bulk of Hallanan's discussion dealt with the function of crude prices in influencing the discovery rate. In great detail he denounced the crude price ceilings of the Office of Price Administration as strangling incentive, crowding out small operators, and preventing the discovery of new reserves. He ended by recommending to the committee the platform drawn by the national oil policy committee of the Petroleum Industry War Council.

The Government's land policy was dissected and criticized by A. C. Mattei, president of Honolulu Oil Corp. He called particular attention to the recent tremendous acquisition of land by various branches of the federal Government, in addition to the old public domain. Instead of leasing lands for war purposes, he said, the Government usually insists on a fee title, but when disposing of such lands it reserves all or the major portion of the mineral rights. This policy of reserving mineral rights is also being followed in connection with farm tenant purchase and other types of government land, Mattei said, and the requirements for leasing such lands are so complicated and onerous that the oil industry is discouraged, with the result that government lands are rather effectively withdrawn from the areas of the United States where it might be possible to explore for new oil. He cited a number of examples where the existence of government-owned lands prevented assembly of blocks for drilling and otherwise prevented exploration work. He urged immediate legislation to have all government lands handled by the general land office for sale or development under general mining laws.

Oil leasing and royalty policies of the Department of the Interior are doing much to hold back development of oil on the public domain, Mattei insisted. He went into considerable detail in explaining the objections to these policies which have been stated forcibly on several instances by representatives of the industry operating in the public lands states.

E. B. Swanson, chairman of the department's petroleum committee, interjected to report that these criticisms are being studied, but he did not promise what action, if any, would be taken.

Mattei insisted that only Congressional action can remedy the situation, and he put into the record the recommendations of the PIWC national oil policy committee and its suggestions for revision of the leasing laws.

Mattei also vigorously denounced the recent attempt of the Departments of Justice and the Interior to claim title to oil underlying tide and submerged lands, describing it as one more action by the federal Government which hampers the industry in its search for oil and which threatens to prevent proper development of our oil resources.

He also ridiculed the policy of maintaining Naval petroleum reserves, pointing out that they constitute only a drop in the bucket of military needs and that they were not developed and that they were incapable of producing much of any oil at the time the Navy needed it.

The wise public land policy of the state of New Mexico, as contrasted with the oppressive and blundering program of the Interior Department with respect to federal lands, was outlined by Hugh L. Sawyers, of the New Mexico Oil and Gas Association, and John M. Kelly, director of the New Mexico Oil Conservation Commission. They showed how New Mexico, by following practices developed by the oil industry, had fostered large new oil developments on its lands, and they reviewed the objections to the federal policy made by many oil operators in the Rocky Mountain area.

Similar statements were made by Glenn E. Nielson, president of Husky Refining Co., Cody, Wyo., and R. P. Jackson, secretary of the Montana Oil Conservation Board. They cited several examples of how the Interior Department's leasing policy is hampering the search for oil and its production, and strongly endorsed early revision of the federal leasing laws.

Interest Evinced in Ocean Drilling

Chairman Joseph C. O'Mahoney of Wyoming showed great interest in the possibilities of developing oil far out at sea, beyond the 3-mile international limit, and much testimony was taken on this subject. James Terry Duce, of The Texas Co., supplied a map of the world showing areas where the continental shelf runs as far as 150 miles off shore without getting deeper than 100 fathoms, or 600 ft. Both he and Dr. W. E. Wrather, director of the U. S. Geological Survey, answered many questions about the possibilities of there being oil under the sea and of extracting it. Because of the chairman's interest in the subject, Mattei promised to have some professors of international law testify as to the legal ownership of such oil in case any should be produced.

Answering industry jibes at the Navy's hoarding policy, Capt. W. G. Greenman, director of Naval Petroleum Reserves, claimed that the Elk Hills reserve is the only field in California now capable of a substantial increase in production. He read a paper outlining the history and nature of each of the Naval reserves, concluding with the admission that the Elk Hills reserve is the only one of any consequence and even there the Navy lacks sufficient knowledge of the structure to know where to go to maintain present production.

Capt. Bart G. Gillespie, just returned from Alaska, outlined the work the Navy has started in Petroleum Reserve No. 4 to prospect for oil there, but promised that no development work would be undertaken unless authorized by Congress.

Exploration on public lands has kept pace with private lands development, Assistant Secretary of Interior Oscar L. Chapman told the committee. Leasing and drilling have been reasonably satisfactory, and production will increase, he said, citing the past 9 years in which oil production on public lands increased 74 per cent compared with a 50 per cent increase on all lands.

Chapman advocated compilation of a complete record of all public lands holdings and urged that the Department of Interior administer all mineral leasing of public lands. He also suggested that the Government continue full scale experimentation of all phases of the oil industry, pioneering in research, to supplement industry's activities.

Additional money will be asked by the department to clear up a backlog of cases relating to oil and gas lease administration and to set up improved administrative methods, Chapman said.

Denying that public lands royal-

(Continued on Page 88)

Capture of German Records Will Boost U. S. Synthetic-Fuel Development

WASHINGTON.—Capture of German research records will put American synthetic-fuels development ahead of even the Nazis, Dr. W. C. Schroeder, acting chief of the Bureau of Mines' office of synthetic fuels and chief of an American party of 22 assigned to study German plants, told the O'Mahoney committee.

The Germans continued research throughout the war, but were unable to put new developments into operation because they were too short of fuel to permit shutting down plants for changes. Information gleaned by scientists in the joint British-American party will be available to both nations, Schroeder explained.

Working almost on the heels of Allied armies, the Enemy Oil Committee studied bombed-out plants and interviewed scientists and engineers, who were for the most part willing to talk about their discoveries.

Two finds of extreme importance were reported by Schroeder. A complete story of an hydrogenation plant at Wessling, written by the plant engineer, provided an illustrated record of this type of operation and disclosed one German dehydration process for making aviation gasoline. Nazi hydrogenation plants were operated at high pressures, and the discovery of new catalysts had permitted them to revise the process and convert the middle oil fractions to high-octane gasoline in a single step. By adding lead, the octane rating was raised from 90 to 95, or high enough for the fuel-injection type of aircraft engine used by the Germans.

Eventual capture, in a house near Reelkirchen, of documents covering both research and production data on the Ruhr-Chemie company opened to the investigators results of German experimentation through January 1945 in the gas-synthesis method of producing liquid fuels and lubricants from coal.

German surface synthetic fuels plants were thoroughly bombed out in the western area open to Allied inspection. Extensive repair crews had been organized to repair bomb damage, but Allied bombing and observation made it possible to knock the plants out again as soon as they were ready to go back into production. Most synthetic plants were going underground, but these had not gone into operation when Germany fell.

No information is available on the plants in eastern Germany, reported to be in better condition, Schroeder revealed. Thus far, neither British nor American scientists have been able to get into this area.

Production of synthetic fuels, estimated at about 4,000,000 tons at the peak period, was cut to below 5 per cent of that amount by Allied bombing, Schroeder revealed. German synthetic aviation methods were advanced to the point where about 90

(Continued on Page 88)

THIS WEEK

PIONEERING—Bureau of Mines "actually making synthetic fuels and gasoline." . . . "Good gasoline and drives engines." . . . ¶Socony-Vacuum undertakes vast research program to develop fuels for gas turbines in ships, locomotives, automobiles, aircraft. . . . ¶Synthetic tires giving excellent service, Goodrich research head says. . . . Will be generally used after war. . . . Some still going strong after 40,000 miles. . . .

LABOR—PAW takes over Humble's Ingleside refinery following court's refusal to grant permanent injunction. . . . Maintenance of membership at center of controversy. . . . ¶Labor disputes threaten "minimum essential quantities" of oil products for Japanese war, Army-Navy Petroleum Board executive says. . . . "If shutdowns continue, may make up in blood what we lose in petroleum products." . . .

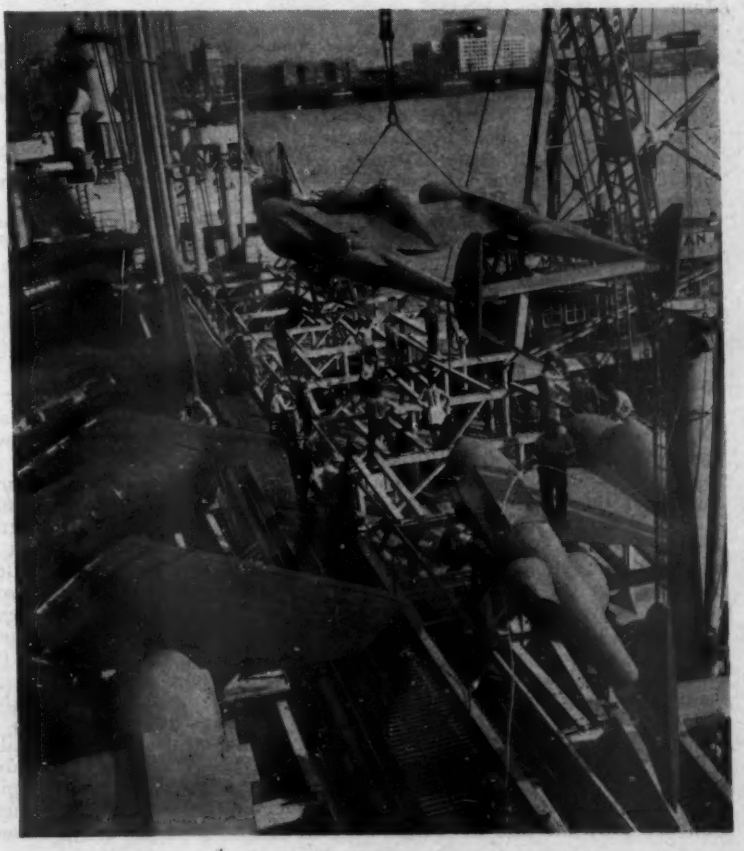
MEDDLING—Protesting against Government's suit to establish ownership of oil under submerged land, Texas land commissioner declares "No sane operator would buy an oil suit with U. S." . . . ¶Honolulu Oil president says Government should not enter oil business by telling its lessees when, where, how deep, how many wells may be drilled. . . . ¶Immediate dissolution of PRC demanded by Seaboard Oil head "to remove constant threat of government competition." . . . "Chills spirit of private enterprise."

PRODUCTION—PAW asks oil industry to produce all-time high of 5,213,100 bbl. daily of all petroleum liquids. . . . Necessitated by rising activity in Pacific war theater and increased distances. . . . ¶National daily crude output at new high, 4,894,650 bbl. . . . Up 12,400. . . . Largest gains contributed by Illinois and California. . . . ¶PAW receives 144 applications for drilling permits in restricted areas of Hugoton gas field. . . . C. F. Roesser, general chairman District 3, takes sharp issue with criticisms of oil subsidy. . . . "Stimulated drilling shallow areas, prevented abandonment of small producers, encouraged surveys looking to secondary recovery." . . .

SCARCITIES—Ethyl fluid stocks at all-time peak, but no higher octane for civilian gasoline in sight, owing to shortage of metallic lead. . . . ¶Oil products critically low in big producing areas of Midwest and Southwest. . . . Restrictions on residual oil in effect in other rationed areas extended now to Midwest. . . . ¶Supply of containers for oil products lowest since war began. . . . Increased bulk distribution and transportation in prospect. . . . ¶J. Edgar Pew ridicules Ickes' warning of oil shortage. . . . Points to "proved reserves" of 20 billion barrels . . . Says "haven't scratched surface." . . .

WAR—Most German refineries bombed out of production weeks before surrender. . . . Tons of records recovered from ruined plants. . . . ¶German technicians cooperate with investigators. . . . Manifest "scientific detachment." . . . ¶Failure of German manufacturers of synthetic fuels and lubes to keep up with research progress hastened collapse. . . . ¶Lutong, Borneo refining center, in hands of Australian troops. . . .

FOREIGN—Brazil protests against getting less oil than Argentina from U. S. . . . Allotment likely to be increased . . . ¶Important deposits of high-quality petroleum discovered on Las Isabelas Island, Mexican possession. . . . ¶Exploratory drilling to begin this summer in central Russia, where large oil deposits have been found. . . . Drilling accelerated in Venezuela. . . .



Her tanks filled with high-octane aviation gasoline, and her deck bristling with fighter planes, this Socony-Vacuum tanker carries a double dose of death and destruction to the Japs by way of the American fighting forces in the Pacific. The engines and other vital parts of the planes are covered with tarpaulin and water-resisting oil. The planes are securely shackled to the superdeck so that rough seas will not loosen them

PAW Calls for All-Time High In Daily Oil Production

WASHINGTON.—The oil industry was called upon by Petroleum Administration for War this week to achieve an all-time high of 5,213,000 bbl. daily in its production of all petroleum liquids during July. This rate represents an increase of 21,000 bbl. over the June certification and of 14,620 over the previous record rate of 5,198,480 bbl. certified for May.

"Accelerated activities in the Pacific theater," explained Deputy Petroleum Administrator Ralph K. Davies, "together with the greatly increased distance over which men and supplies must be transported, have increased the needs for some petroleum products, particularly fuel oil."

The July production rate includes 4,879,900 bbl. of crude oil and 333,200 of natural gasoline and other petroleum liquids. It represents an increase of 20,300 bbl. of crude oil over the 4,859,600 certified for June. Certification of natural gasoline and other petroleum liquids is 700 bbl. more than the 332,500 certified for June.

Comparing the rates by areas with those for June, the July production certified to the East Coast states (District 1) remains unchanged at 63,000 bbl. daily; Midwestern states (District 2), 997,600 bbl., up 10,000 (entire increase is in crude oil and will come from Oklahoma, where continued development of the West Edmond field has increased productive capacity); southwestern states (District 3), practically unchanged at 2,984,000 bbl.; Rocky Mountain states (District 4), 155,600 bbl., up 5,200; California, 1,012,900 bbl., up 5,700.

	July 1945	
	Certified total petroleum liquids	Estimated nat. gasoline and condensate
District 1—		
New York	12,000	.....
Pennsylvania	37,800	800
West Virginia	13,200	5,000
Total	63,000	5,800
District 2—		
Illinois	212,000	12,000
Indiana	13,000	.....
Kansas	278,100	4,100
Kentucky	30,200	2,200
Michigan	47,700	700
Nebraska	1,000	.....
Ohio	7,600	600
Oklahoma	408,000	28,000
Total	997,600	47,600
District 3—		
Alabama	500	.....
Arkansas	85,000	5,000
Louisiana	402,500	42,500
Mississippi	53,000	.....
New Mexico	110,000	5,000
Texas	2,333,000	*163,000
Total	2,984,000	215,500
District 4—		
Colorado	12,000	.....
Montana	22,300	300
Wyoming	121,300	3,100
Total	155,600	3,400
District 5—		
California	1,012,900	†60,900
Total U. S.	5,213,100	333,200

*Includes 16,000 bbl. per day of separator condensate over and above anticipated plant production. †Includes 5,200 bbl. per day Paloma condensate production.

Decision Reserved in Patents Case

NEW YORK.—Decision was reserved by Judge Charles E. Wyzanski, U. S. District Court, Southern District of New York, after the conclusion of the 3-week trial of the suit of Standard Oil Co. of New Jersey, Standard Development Co., Standard Catalytic Co., and Jasco, Inc. vs. James B. Markham, as alien property custodian. Standard seeks to recover 2,500 patents seized by the alien property custodian because of alleged German interest in them. Briefs will be submitted August 1, and reply briefs by September 1.

The court ruled that the question of ownership only was involved, and no antitrust evidence was allowed. Standard contends that no German interest remained in the patents after the Hague memorandum was drawn in 1939.

Dr. August von Knieriem, former chief of the legal and patent department of the I. G. Farben Industrie, A. G. was brought to the court to testify from a prison camp in Germany. He identified a letter from headquarters of the German Army giving consent to the German company's transfer of patents to the Standard group.

Robert T. Haslam testified that when joint research was begun in 1930 on the project it was totally uncommercial and only a research possibility. Frank Howard, former president of Standard Development Co., testified that the patents were desired because of their value to the national defense, and that there was no understanding that the patents would be returned to the German company after the war.

Standard purchased the patents involved from the I. G. Farben Industrie, A. G. for $35,000,000 in 1929. They include processes for buna-rubber manufacture, 100-octane gasoline, and synthetic toluene.

New Record Established in Lake Tanker Movement

CHICAGO.—With a total of 73,854,355 bbl., a new record was established in 1944 in movement of oil and oil products on the Great Lakes. The increase resulted from a wartime shift to shorter hauls by the smaller tanker fleet available. Contributing to the new high was completion of Sinclair Refining Co.'s pipe line from Chicago to Toledo, and its use to supplement the tankers' West-East movement. Though there was a slight drop in the lake movement of American oil and products, the gain in Canadian traffic was sufficient to set the new total.

The combined American and Canadian oil trade was accomplished last year by the established lake tanker fleet, comprising 36 vessels of American and 34 of Canadian registry. In the preceding season, when movement was 9,449,867 tons, or 70,401,519 bbl., the lake fleet was assisted for various periods by 11 tank craft recruited from the East Coast.

Sun Observes 50 Years of Refining at Toledo

TOLEDO.—J. Howard Pew, president of Sun Oil Co., was the principal speaker in a program June 25 marking 50 years of refining at the company's Toledo plant, where Pew himself once was employed. Other company officers on the guest list were: J. Edgar Pew, vice president in charge of production; Arthur E. Pew, Jr., vice president in charge of manufacturing; S. B. Eckert, vice president in charge of marketing; Andrew W. MacMurtrie, manager of the company's refinery at Marcus Hook, Pa., and C. B. Carter, refining superintendent, Oklahoma division.

Sun bought the small Crystal Oil Co. at the site of the present refinery in 1895. The property consisted of a few oil wells, four batch stills and one steam still, with a working force of five men. Now a leading producer of aviation-gasoline base stock and butadiene for manufacture of synthetic rubber, Sun today employs approximately 800 men and women.

Verbal Clashes Mark Hearing on Ownership of Tideland Oil

WASHINGTON. — Verbal clashes over the ownership of tideland oil deposits continued following the close of House Judiciary Committee hearings last week with sharp interchanges between Interior Secretary Harold L. Ickes and California Attorney General Robert W. Kenny.

Replying to a letter from Ickes to Chairman Hatton Sumners to which the secretary charged that 40 of 46 states attorneys general represented hidden interests rather than their own states, Kenny denied Ickes' statement that the sole tidelands issue is "some specific valuable oil off the California coast." Government attorneys have stated, Kenny said, that if the Government took oil from California coastal lands it would necessarily follow as a matter of law that they would have to go in and take over all ports and harbors of the United States. This, Kenny said, is because lands under coastal waters and inland navigable waters are all held under the principle of state sovereignty.

If the principle of state sovereignty is destroyed in California, Kenny said, all other states will be equally affected. Supporting the claims of 46 attorneys general that the tidelands question needs no further litigation, Kenny cited the long series of Supreme Court decisions upholding the state's contentions, plus rulings of Secretary Ickes himself, who, Kenny said, up to 1937, consistently ruled that lands off the coast of California and elsewhere belonged to the states.

No Government Witnesses

The tidelands issue, on which hearings before the Sumners committee were brought to a close without hearing Government witnesses, was brought to a head by a Department of Justice suit to enjoin Pacific Western Oil Corp. from operating off Santa Barbara under a California drilling permit.

Ickes, at a press conference devoted largely to the tidelands question, told newsmen that the department is interested only in offshore oil.

"Boston and New York harbors have nothing to worry about," he said, and added later that Texas offcoast lands were not involved since Texas came into the Union under different circumstances from California. "The suit against Pacific Western Corp. is only an effort to establish title to the oil and is not intended to jeopardize ownership of huge harbor investments and developments on filled-in lands."

The federal Government, Ickes said, has shown itself a "better guardian—poor as it has been—of natural resources than some states." The states, he said, never had the oil. The department merely wants the courts to decide precisely who owns it.

Highlighting apparent federal encroachment upon underwater oil last week was an executive order issued by President Truman under the Second War Powers Act authorizing the secretary of interior to purchase or condemn land underlying the Cerritos Channel in Long Beach and Los Angeles, a strip of dredged land 600 ft. wide and 7,000 ft. long. The order authorized the secretary to take necessary action "to protect the United States from loss on account of drainage or threatened drainage of oil or gas from such land."

Condemnation Suit in Offing

Ickes said that a condemnation suit will probably be brought against Union Pacific Railroad to obtain undisputed title to the petroleum located under the channel. This oil, Ickes said, was transferred to the federal Government by deed giving the United States control of the waterway. Federal courts sustained ownership of the land, Ickes said, but did not make it clear whether the railroad or the United States possesses the mineral rights. The executive order was issued, Ickes said, because the Government probably owns the oil but, under a Ninth Circuit Court of Appeals decision, probably can't extract it. Condemnation will be necessary because the reserves may be exhausted by drainage before the Government acquires it by other means.

Ickes this week told Kenny that he would recommend to the attorney general the dismissal of the present action in California and simultaneously file suit in the Supreme Court of the United States to clear the title of the United States to the specific oil-bearing lands involved in the Pacific Western suit.

"Should the Supreme Court uphold the claims of the United States to the oil lands," Ickes said, "I would be prepared to recommend congressional action to convey the land itself to the state or appropriate municipality, reserving only the mineral deposits therein."

Georgia's New Commission Discusses Rules for State

WAYCROSS.—Proposed rules and regulations for conservation of oil and natural gas were discussed here June 26 by the newly organized Georgia State Oil and Gas Commission. The commission, established by the state legislature, will study suggestions offered at the meeting, and will recommend the enactment into law of those regarded as meeting conditions in Georgia's new oil and gas industry. The meeting was open to the public. George M. Bazemore, Waycross banker, is chairman of the commission, and C. W. Deming is ex-officio secretary. Headquarters for the commission have been established in Waycross.

Ellenburger Is Studied

AUSTIN. — A 10-day field and study trip to examine the Ellenburger formation in the Llano region of Central Texas has resulted in publication by the University of Texas Mineral Resource Circular 34, "Representative Sections of the Ellenburger Group in Central Texas."

Ickes Declares Resignation Not Accepted

WASHINGTON.—There "ain't no vacancy" in the chair of the Secretary of the Interior, its long-time incumbent told the press last week. If there were, conflicting reports of Ickes' successor might well all be right. "It would take two men to fill the job."

With customary acerbity and unaccustomed patience, Harold L. Ickes explained that while he was the resignings man in government, his option had not been taken up yet. Nor, he said, had he discussed his leaving with President Truman. He had visited the White House, he admitted, but only to consult Admiral McIntyre (the President's personal physician) about a cold. The president, he pointed out for the benefit of those who did not read their own newspapers, was "in absentia," specifically fishing in the State of Washington.

President Truman later in the day confirmed the secretary's statement. He isn't being replaced now.

Shepard New Chairman Of Anglo-American

THE Anglo-American Oil Co., Ltd., British subsidiary of the Standard Oil Co. of New Jersey, has added three directors: David Allan Shepard, Robert Halsted Porters and William Ernest Jenkins.

Shepard has been elected chairman, succeeding E. E. Soubry, who has resigned because of his new duties in charge of marketing outside the United States for the Standard of New Jersey. During 1942-1943, Shepard was petroleum attache for the State Department at the U. S. Embassy in London, and subsequently was appointed a representative of the Standard of New Jersey in the United Kingdom. He joined the Standard of New Jersey in 1927 as a research engineer and was engaged from then until 1942 in connection with oil hydrogenation, product-specifications and product-application problems.

Porters joined the Standard group in June 1936 and was elected a member of the Council of the International Association (Petroleum Industry), Ltd., in 1942. He is financial adviser to the Standard of New Jersey for the whole of Europe.

Jenkins, who is 53 years of age, is known for his work with the Petroleum Board as Controller of its Finance and Accounts Division. He joined the company in 1920 as a traveling auditor and became its secretary in 1933.

R. A. Carder, who was appointed to the board in 1933, is managing director of the company. The other directors are: A. Waterston, J. L. N. Pollock and L. Sinclair.

Predicts General Postwar Use of Synthetic Tires

AKRON. — General use of synthetic tires for passenger cars in the postwar period is predicted by Dr. Howard S. Fritz, director of research for B. F. Goodrich Co. These tires are giving excellent service on thousands of automobiles and have gained a permanent place in the country's transportation program, he said.

"We have made virtually as much progress in 4 years of intensive appraisal and application of synthetic rubber as we have in 40 years' development of the natural product," the research director declared.

"In 1941 only 6,000 tons of synthetics was manufactured in the United States while 775,000 tons of rubber was imported. Now the output of synthetic is 1,200,000 tons a year and it is being utilized satisfactorily for almost all purposes where natural rubber was employed formerly."

Dr. Fritz added that increasing output would lower costs of manufacture, and that a price level of 11 cents a pound might be seen.

Asked what would become of rubber plantations when conditions permitted the exportation of rubber after the war, Dr. Fritz said that the demand during the first few years of peace would be large enough to absorb most of the synthetic and natural rubber produced. "Production of both types of rubber after that period should be governed by economics," he added.

Dr. Fritz said that synthetic tires now being produced were giving 40,000 miles of continuous service to civilian motorists.

Prices Posted for Wyoming And Montana Fields

The Ohio Oil Co. and Stanolind Oil & Gas Co. have posted prices for crude oil in the Elk Basin field, Wyoming and Montana, and the Frontier and Grass Creek (light) fields, Wyoming, as follows: For 40° gravity and above, $1.25 per barrel, with 2 cents differential for lower-gravity crudes to 21° gravity, 85 cents. Ohio Oil makes the same prices applicable for the Rock Creek field, Wyoming. Stanolind will pay 65 cents a barrel for Grass Creek heavy oil. All prices are effective as of June 1.

Time Limit to Be Enforced In Stripper Subsidy Claims

WASHINGTON. — Stripper - well compensatory claims for the month of May and subsequent months will not be paid unless they are filed within the time limits set by Regulation 7, Defense Supplies Corp. announced this week. The regulation provides that claims must be filed not later than the 20th day of the second month following the month covered by the claim.

Additional leeway has been given in the past, due to difficulties in getting the program on a smooth basis, the agency said. However, in view of the time the regulation is in effect, DSC considers that, ordinarily, claims can be filed within the prescribed time.

On claims for months prior to May 1945, filed on or after July 1, 1945, consideration will be given only upon receipt of a statement explaining why the claim was not filed within the scheduled time.

California Producers Elect Standing Subcommittees

LOS ANGELES.—The two standing subcommittees of the conservation committee of California Oil Producers were chosen at the organization's annual election.

The new administrative committee consists of Emil Kluth, of George F. Getty, Inc., chairman; Henry F. Power, General Petroleum Corp.; Guy H. Cherry, Jr., Five C Refining Co.; R. A. Holman, Amerada Petroleum Corp., and T. H. Sherman, Huntington State Co.

The new allocation committee consists of A. H. Bell, Continental Oil Co., chairman; Lot Bowen, Western Gulf Oil Co.; H. A. Brett, Union Oil Co. of California; E. Robert Burns, MacDonald & Burns; D. L. Caldwell, Barnsdall Oil Co.; W. A. Clark, The Texas Co., and C. W. Stephens, The Ohio Oil Co.

What Others Say

Welding Standard Proposed

Dear Sirs:

Industry in general, and the welding industry in particular, are and have been greatly handicapped by the lack of a real technical standard covering electrodes.

True it is, there has been in existence for some years a so-called standard which actually might be termed a "buyers' guide," known as "Tentative Specifications" published by the A.W.S.

However, even in this long and complicated "buyers' guide" there are so many discrepancies with ambiguous and contradictory statements that it is rendered entirely unsatisfactory.

Since there is no need for a weld stronger or better than the material to be welded, I suggest for mild steel which covers 90 per cent of the requirements, a simple standard something as follows:

The electrode shall be of such characteristics that it will withstand the following tests to be made any time a buyer might desire:

1. A weld made in ⅜ in. or ½ in. plate of mild steel, planed to the same thickness as the parent metal, must break outside of the weld when pulled in a standard tension machine.

2. On a section from the same plate mentioned in (1), welds to be bent in any way desired and elongation of 25 per cent in the outside fibers must show no fracture.

It is quite evident that an electrode which will perform as indicated in these two tests will give a weld equal in physical qualities to the plate.

With such a weld obviously the matter of porosity is of no consequence. However, if it should be desired to cover the question of porosity, a simple test could be made as follows:

A fracture shall be made through the weld. On a straight line through the fractured weld there shall be voids of no more than 5 per cent cumulatively.

It seems to me that this is a question to which the Filler Metal committee of the American Welding Society, 33 West 39 Street, New York City, should give proper attention. Yours very truly,

J. F. LINCOLN.
President, The Lincoln Electric Co.

FOUNDED IN 1910

BY PATRICK C. BOYLE

the OIL AND GAS JOURNAL

An Industry Matter

UNQUALIFIED support of the entire industry should be placed behind the current battle to exclude coercion in the relationship between employer and employe. The case now undergoing adjudication, with the Government winning the first round, happens to be the War Labor Board vs. Humble Oil & Refining Co. It might be any other company, however, and the issue would be just as vital to the petroleum industry.

The case is 2 years old, but last week's seizure of the Humble refinery at Ingleside, Tex., by order of President Truman makes it the business of every oil man in the country. If the executive branch of the Government can force acceptance of an untenable concept of employer-employe relationship at Ingleside, it can exercise the same power wherever the whims of bureaucracy dictate. There is no telling where the vagaries of WLB will be asserted next.

It matters little that Humble lost its fight to prevent seizure of its refinery. Neither is it particularly important that Petroleum Administration for War was directed to execute the presidential order for the seizure. PAW happens to be the only agency in Washington qualified to direct operation of a refinery without serious stoppage of war-product manufacture. The thing that matters most is whether the present decision is to stand or will it be set aside and the fetters removed from the operating company so that it may regain possession of its property and resume direction of its business.

Fundamentals of the dispute are simple. Humble was ordered by National War Labor Board to include a maintenance-of-membership clause in its contract with the C.I.O. local in April, 1944. The order was issued without hearing and in direct negation of previous rulings. A tripartite labor panel and the Eighth Regional War Labor Board had reviewed the dispute and had sustained the company's position. In November 1944 a majority of the 340 employes at Ingleside voted to issue a strike notice. However, no stoppage of work ensued and none was imminent when the presidential seizure order was issued, presumably on the advice of Norman H. Davis, director of economic stabilization and chairman of WLB when the dispute originated.

Humble exhausted every injunctive maneuver at its disposal and succeeded in delaying seizure of its plant from June 6 to June 22. The company next will appeal to the Circuit Court and to successively higher tribunals if necessary.

During its 2-year struggle with WLB, Humble has suffered harassing obstacles at the hands of the eighth regional office, which refused to consider applications for wage increases, thus fomenting unrest among employes.

Compliance with the WLB order would compel the company to discharge any employe failing to continue his union membership. This concept, the company rightfully contends, is in direct violation of guarantees in the National Labor Relations Act. Right of the individual to bargain with his employer through whatever medium he chooses is irrevocably assigned to C.I.O. if the maintenance-of-membership clause is accepted.

Dignity of the employe, whether singly, in a group, or as an integral part of a consolidated unit demands retention of his privilege to choose.

INTERNATIONAL

Creole Completions Show Rise in Drilling Activity

Well completions by Creole Petroleum Corp. in Venezuela rose to the year's peak of 24 during May. This new record in drilling operations was accompanied by another peak in Creole production which averaged 458,618 bbl. per day during the month.

Lake Maracaibo producing fields accounted for 317,603 bbl. per day of the May production record, an increase of 8,584 bbl., compared to April. Creole's eastern Venezuelan fields, including Cumarebo, produced 141,015 bbl. daily in April, a gain of 8,815 over the April output.

Average daily production from Creole properties in May 1944 was 367,173 bbl. daily which was divided 273,380 bbl. daily to Lake Maracaibo operations and 93,793 bbl. in the eastern fields.

Ten of Creole's 24 completions in May were in the Jusepin area and included nine producers with average initial yield of 573 bbl. daily and one failure. Average depth of Jusepin completions was 5,499 ft. In the Lake Maracaibo district, Creole completed eight wells, all producers, with average initial of 1,445 bbl. daily, and with average depth of 4,993 ft. Four producers completed in the Mulata field at the average depth of 5,719 ft., yielded average initial of 276 bbl. daily. One new well was added in the Cumarebo field and it produced 50 bbl. per day from 2,150 ft.

One deep exploratory failure was abandoned after drilling to 9,160 ft.

Creole's two Venezuelan refineries processed 24,264 bbl. daily in May, a decline from 30,838 bbl. per day in April. A reduction of nearly 7,000 bbl. per day was reported in throughput of the Carapito refinery in eastern Venezuela.

Production has shown a steady and uninterrupted increase since start of the year. Creole daily average output during the first 4 months was: 390,245 bbl. in January; 407,935 bbl. in February; 425,084 bbl. in March, and 441,219 bbl. in April.

Mercedes Pushes Drilling Program in Venezuela

Equipment and supplies have been obtained by S. A. Petrolera las Mercedes for drilling 14 more wells on land under development by that company in eastern Venezuela. Plans were announced at the recent annual meeting in London of Ultramar Co., Ltd., of which Mercedes is an affiliate. Mercedes received exploratory concessions on 271,000 acres from the Venezuelan Government.

Development work thus far performed by Mercedes indicates oil in commercial volume along a 7-mile belt. With the accelerated drilling program now under way it is believed probable the last of the 14 wells will be finished early in 1946. It is hoped to establish oil reserves sufficient to justify arrangements for transportation of oil to the coast. Steps already have been taken looking to installation of a terminal.

Mercedes Well 7 was completed as a 370-bbl. producer. Well 8, on a separate structure 3 miles southwest of No. 7, was a dual completion, yielding 3,000,000 cu. ft. of gas from one sand and 99 bbl. of oil from a lower one. No. 9, a dual completion ¾ mile down flank from No. 8, was reported good for 774 bbl. of oil and 1,500,000 cu. ft. of gas. No. 10 is being drilled.

Caracas Petroleum S. A., wholly owned subsidiary of Ultramar, has a half interest in Mercedes.

Mexican High-Octane Plant To Be Ready in December

MEXICO CITY.—The high-octane refinery under construction in a suburb of Mexico City at a cost of $18,000,000 will be ready for operation in December, Efrain Buenrostro, manager of the government oil industry, announces. It will have a capacity of 50,000 bbl. of crude daily. Also under construction is a modern absorption plant at the Poza Rica field, so that gas now being wasted can be utilized.

A pipe line from the Poza Rica field near Tampico is being enlarged to a 40,000-bbl. daily capacity, as against 23,000 now.

Socony-Vacuum Starts Magdalena Valley Test

An important wildcat test in the Middle Magdalena Valley of Colombia is highlighting activities of Socony-Vacuum Oil Co. in that area. Socony-Vacuum, either directly or through affiliated companies, now has six concessions under contract totalling 176,159 hectares; one is producing, an important wildcat is under way in another, and three more are to be tested during 1945.

The test in the Middle Magdalena Valley has been spudded in the El Pedral concession by the Compania de Petroleos del Valle del Magdalena, an affiliate of Socony-Vacuum, to test a seismograph prospect 10 miles southeast of the Cantagallo field, opened recently by the same company. It will be a tertiary test, with an objective depth of 8,000 ft.

Three new wells are planned for the latter half of 1945 in the Cantagallo field, located in the Cantagallo concession, about 25 kilometers north of Shell Oil Co.'s Casabe field, along the west bank of the Magdalena River. Three wells already completed are each capable of producing about 250 bbl. of 21° gravity oil per day, with a casing pressure of 800 psi., tubing pressure of 300 psi., and gas-oil ratio of about 200 cu. ft. per barrel. The average drilling depth of the field is 6,000 ft. One more well is expected to complete in this field in July.

A series of shallow structural holes is being started in the upper Cimitarra River area with a core-hole drill, to check geological and seismograph interpretation of structural conditions, prior to drilling an exploratory well. This area lies about 15 miles southwest of Cantagallo field. About 20 miles east of field, three shallow tests are planned for the second half of the year in the Las Monal concession, to obtain a better structural interpretation of the Las Monas structure. Present objective depth is about 3,000 ft., and a deep test may be drilled in 1946.

An interesting wildcat test is under way in the Sinu district of the Department of Bolivar in the Floresanto concession, operated by the Sinu Oil Co. This field lies about 50 miles southwest of the Convenas pipe-line terminal. Preliminary tests indicated a production of about 50 bbl. per day through ⅛-in. choke, 51° gravity, at a depth of 625-50 ft., but the well soon sanded up and is not producing now. Operators are now drilling at 6,240 ft. Another rig has been ordered from the states to test the productivity of the shallow sands. Socony-Vacuum is affiliated with Tropical Oil Co. in this venture.

Seismograph work is now being completed in the Pivijay concession, which lies some 30 miles northwest of Shell's El Dificil field. A deep test, with an objective depth of 10,000 ft., is planned to start during the second half of 1945.

Socony-Vacuum affiliated companies operating in Colombia have jointly applied for 39 concession applications covering 1,108,755 hectares. In addition, they hold 220,420 hectares of private lands under lease. The Sinu Oil Co. and the New Granada Oil Co. have been organized in the United States as affiliates of Socony-Vacuum, and obtained permission to operate in Colombia

Crude-Oil Ceilings Raised By OPA in Six States

WASHINGTON.—Increases of 2 to 35 cents a barrel in ceiling prices for crude oil in 21 pools in six states, effective June 1, have been allowed by Office of Price Administration. The pools, and the amount of each increase in cents per barrel, follow:

Kansas—Dopita, 6; Gideon, 25; McLouth Lime, 35; Ploog, 35; Roxbury S. E., 4; Shallow Water, 2; Starr, 35.

Oklahoma—Doyle (1,200 ft.), 35; Hotulke-West Earlsboro, 20; Pearsonia, 11; Skiatook West, 35; Wofford, 35.

New Mexico—Empire, 35; Getty, 18; Shugart North, 20.

Texas—Akard, 20; Edwards, 25; Fuhrman-Mascho, 4.

Wyoming—Dallas and Derby, 35; Garland (Madison), 35.

Indiana—Half Moon, 25.

In the Getty pool, New Mexico, the 18-cent increase is a revision of a previous increase of 14 cents. West Earlsboro pool, Oklahoma, which has been combined with Hotulke pool, with a 20-cent increase, previously had an increase of 25 cents. Increases previously granted to Freeman pool, Michigan, and Angleton pool, Texas, have been revoked. Angleton was shown not to qualify, and Freeman pool has been determined to be a part of the Temple pool, which does not qualify. Increases previously granted to the Bayou Choctaw pool and the Timbalier Bay pool, Louisiana, are restricted to crude oil from the Miocene formations. Tibbens pool, Oklahoma, has been redesignated to include Tibbens North. The increase already granted to the Capitan (Sespe) pool, California, applies to crude oil produced from the Sespe formation above 3,000 ft.

PAW Has 144 Requests for Hugoton Drilling Permits

WASHINGTON. — Petroleum Administration for War has received 144 applications for permission to drill wells in the Hugoton natural-gas field since the Oklahoma and Kansas portions were declared a restricted area on May 1. Of this number, Deputy Petroleum Administrator Ralph K. Davies said, 73 wells were authorized to start at once; 27 applications were granted for drilling to start in the last quarter of the present calendar year; 18 were denied, and 26 are still pending. The restriction order was issued to forestall drilling nonessential wells using scarce casing and tubing.

"Each application is considered on its merits," Davies said. "We want to make sure, in each instance, that there is a necessary marketable outlet for the gas before a drilling application is granted."

Regulation of drilling in the Hugoton field, instituted in December 1941, was relaxed in June 1944. The restriction order was issued on May 1, when War Production Board sought new cuts in the use of steel.

Body Named to Coordinate Tanker Transportation

WASHINGTON. — With approval of Petroleum Administration for War, nine members, with alternates, have been appointed to the newly created bulk-tonnage coordinating committee, a suborganization of the Foreign Operations Committee of the petroleum industry.

This group will work with the European Petroleum Supply Committee, North Africa Supply and Distribution Committee, West Africa Supply and Distribution Committee and Near East and Far East Supply and Distribution Committee to coordinate tanker transportation problems growing out of their respective assignments. The members are:

L. K. Blood, Standard Oil Co. (New Jersey), and H. T. Dodge, The Texas Co.; alternates, L. C. Quackenbush, Alliance Oil Corp., and H. I. Casteel, Republic Oil Refining Co.—all of European Petroleum Supply Committee.

H. E. Pratt, Socony-Vacuum Oil Co. and H. A. Thomas, The Texas Co.; alternates, H. S. Homet, Socony-Vacuum Oil Co., and J. F. Wooler, Atlantic Refining Co.—all of West Africa Supply and Distribution Committee.

W. F. Dunning, Standard-Vacuum Oil Co., and C. R. Cuddy, California-Texas Oil Co.; alternates, E. J. Smith, Standard-Vacuum Oil Co., and W. P. Gaynor, Jr., California-Texas Oil Co.—all of Near East and Far East Supply and Distribution Committee.

N. Goddard, Socony-Vacuum Oil Co., and H. A. Hassan, Sinclair Oil Corp.; alternates, W. A. Berryman, Gulf Oil Corp. and D. H. Morris, Valvoline Oil Co.—all of North Africa Supply and Distribution Committee.

J. P. Berkin, Asiatic Petroleum Corp., member at large; alternate, A. M. Wylie, Anglo-Iranian Oil Co., Ltd.

Sale of Six Tankers to Oil Companies Is Approved

WASHINGTON. — United States Maritime Commission has approved sale to two oil companies of six fast, modern tankers under construction at the Chester, Pa., yard of Sun Shipbuilding & Dry Dock Co.

The purchasers are Standard Oil Co. of California, San Francisco, and Atlantic Refining Co., Philadelphia. Each is buying three of the new T2-SE-A1 turbo-electric type tankers at their estimated cost of $2,850,000 each, exclusive of the cost of national-defense features borne by the Maritime Commission. In each case six old tankers, all more than 17 years of age and deemed obsolete for purposes of postwar commercial operation, are being accepted for credit allowance.

The new tankers have 6,000-hp. turboelectric propulsion, giving an average speed of 14.5 to 15 knots. They are 523 ft., 6 in. long, and have a cruising radius of 12,400 miles. Each is of 10,138 gross tons, 16,655 deadweight and has a cargo capacity of 138,333 bbl. of gasoline.

Delivery of all six will be completed by the end of September. Those acquired by Atlantic Refining Co. will be named Atlantic Refiner, Atlantic Mariner and Atlantic Ranger. Those acquired by Standard Oil Co. of California will be named J. L. Hanna, J. H. MacCaregill and H. D. Collier, in honor of officials of that company.

American Synthetic Rubber Superior to Germany's

WASHINGTON.—"American synthetic rubber, the methods of manufacturing it, and the products made from it are generally superior to those of Germany," John L. Collyer, War Production Board's special director of rubber programs, and S. T. Crossland, executive vice president of Rubber Reserve Co., said in a joint statement last week following their return from Europe, where they were members of a mission studying rubber development.

The technical mission, headed by Russell Hopkinson, director of commercial development of United States Rubber Co., went into Germany before V-E day. German tires are now being tested further in the United States in direct comparison with American synthetic tires, it was reported.

"Germany reached a commercial scale of synthetic rubber production many years before this country. The total rated capacity of their industry was 170,000 tons a year, but their actual production never exceeded 110,000 tons a year," Collyer and Crossland said. "By contrast, the United States in 2 years established a synthetic-rubber industry with a rated capacity of 850,000 tons a year and it has been demonstrated that it can operate at 130 per cent of that rate. With minor revisions and additions to certain existing plants, the American industry is expected in 1946 to produce 1,200,000 tons, or 140 per cent of its original rated capacity."

Witnesses Plead for Removal of Control

(Continued from page 78)

ties are too high, Chapman said the average is frequently lower than private leases, and he questioned the statement of Mattei that industry prefers not to lease public lands if other oil-bearing land is available.

Effect of the 1942 O'Mahoney act, providing a flat royalty of 12½ per cent for public lands discoveries made during a national emergency was cited by Chapman as a spur to increased discoveries. The law, he said, has resulted in discovery of 45 new pools which increased the public land reserves by an estimated 85 million barrels. Mattei, in questioning from the floor, cited the law as an illustration of the effect of lowered royalty rates upon wildcatting.

Commenting following Chapman's testimony, Mattei pointed out that the industry wants legislation on the mineral leasing act to correct the regulations and lease form. He questioned the royalty policy, suggesting that larger over-all royalties would result from lowering percentages as an incentive to added exploration.

Some bonuses paid on public lands have been overestimated, Mattei said, citing the Elk Basin field for which the highest bonus on record was paid. An early successful well led to overestimating the field, he said.

Mattei, discussing recommendations made by his committee which are now under consideration by the Secretary of the Interior, said he disliked the idea of the secretary holding mandatory control of production over unitized area. Chapman indicated that while the department would go along with many of the industry committee's recommendations, it would not favor any restriction of the secretary's power over conservation of oil.

Harold L. Duncan, chief, conservation branch of the U. S. Geological Survey, presented additional lease and production facts covering public domain lands, and told the committee that the slow development of oil resources in such public lands states as Montana, Colorado, Wyoming and New Mexico has been due more to other causes than adverse conditions of the mineral leasing act. Distance to refineries, scarce local markets and similar natural difficulties were the real causes, he said.

Hearings were resumed June 27 on the general subject of diplomatic protection. First witness scheduled was Charles Rayner, petroleum adviser, Department of State, with Army and Navy and possibly other government witnesses to follow. The industry committee, with Brewster Jennings as chairman, was scheduled to make its presentation at the close of the government statements.

Capture of Records to Boost Synthetic Fuel

(Continued from page 78)

per cent of her aviation gas was made synthetically, and powerful catalysts were developed to the point where one entire step in the process had been eliminated.

Other Department of Interior witnesses reported on the American synthetic fuels program. Michael Strauss, assistant secretary, told the committee that Bureau of Mines research, with industry's help, has brought a new synthetic fuels industry within the nation's reach. This, he said, will make the United States ready for a declaration of oil independence at any time that our dwindling domestic natural petroleum reserves make it necessary to turn to synthetics. That time, Strauss added, may be "sooner than we think."

United States known reserves, other witnesses brought out, include 14.5 billion tons of shale oil; 3.2 billion tons of crude oil; 2.8 billion tons of natural gas; 3,176 billion tons of coal.

Petroleum, natural-gas and oil-shale resources known now are sufficient to last for 85 years. Sufficient coal, particularly of the North Dakota variety which is especially adaptable to conversion into synthetic liquid fuels, is available to last the nation a thousand years at present rate of consumption.

Present synthetic methods are uneconomic, even by the most advanced German processes. Recovery of oil from oil shales would be economic if the price of natural petroleum reached $2.00 per barrel, possibly less.

Discussing secondary-recovery methods, Bureau of Mines experts pointed out that oil reserves can be expanded 12.6 per cent by present known methods, and potentially the possibility of recovery is several times present proved reserves. Improvement in the price of oil, they indicated, would bring about increased research into secondary-recovery methods.

DEATHS

Allan V. Ritchie, 59, superintendent of The Texas Co.'s research laboratory at Beacon, N. Y., died of a heart attack June 19 at New York. He was employed by The Texas Co. in July 1923, first as a chemist and later as a treater foreman at the company's Casper refinery. In 1925, he was transferred to Texaco's Port Arthur plant as a chemist, and in the following year was transferred to the company's refinery at Lockport, Ill., as a chemist. In 1928 he became an engineering chemist in the company's technical division, New York. When the Beacon research laboratory was opened in 1931, he became superintendent. On June 25, he was to have received an award from the Office of Scientific Research and Development in recognition of certain confidential research work connected with the war effort. The award will be presented to his widow.

Dell J. Crosby, 45, chief scout for Humble Oil & Refining Co., Houston, died June 17 from a heart attack. He served as president of National Oil Scouts and Landmen's Association in 1943-44.

Harry Shulman, 48, Kilgore, Tex., producer and drilling contractor, died June 14.

Raymond W. Ross, assistant to the sales manager of The Texas Co.'s central territory, with headquarters in Chicago, died June 19, from a fall from a hotel in Denver.

Keating Ransone, 50, oil operator died June 22 in Houston. He was a student at University of Texas when World War 1 began, and he left school to enter military service.

Herbert O. Koehler, 55, oil operator, died June 23 in Tulsa.

James M. Hemby, 82, oil producer, died June 20 in Electra, Tex. Besides his oil holdings in Texas he had mining interests at Cripple Creek, Colo.

A. P. Enloe, 55, civil engineer formerly with Nabors Oil Corp., at Natchez, Miss., died June 19 in New Orleans.

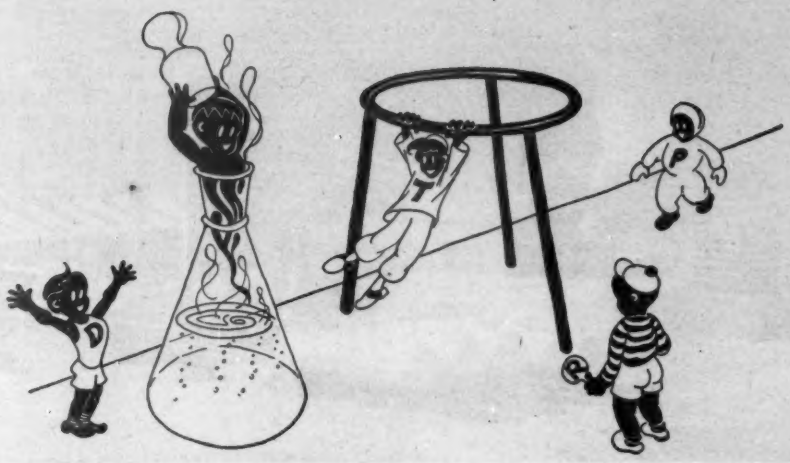
Thomas F. Hart, 57, purchasing agent for Petroleum Machinery Corp., New York, died June 8 in Brooklyn.

Earl W. Allington, 51, eastern representative for The Chek-Chart Corp., died June 20 in New York.

James D. Phelan, 59, oil producer in the Torrance-Redondo fields, died last week in Torrance, Calif.

Charles B. Braden, 59, Kansas operator and drilling contractor died in Wichita, June 25. He had been active in Kansas producing operations since 1917.

C. C. Eshelman, 59, for 22 years an oil-well shooter for Independent Eastern Torpedo Co., died June 25 in Tulsa.



Test Tube Baby #5
Isooctane

Isooctane is made by another of the revolutionary processes to come from the UOP laboratories. Polymerization and hydrogenation are combined. By combining selected olefins, and hydrogenating this product in the presence of UOP catalysts, isooctane is produced. UOP commercial isooctane units have been in successful operation for eight years.

CATALYTIC CRACKING
CATALYTIC REFORMING
HYDROGENATION
ALKYLATION
ISOMERIZATION

THERMAL CRACKING
THERMAL REFORMING
HYDROFORMING
DEHYDROGENATION
POLYMERIZATION

RETREATING
POLYTREATING
U. O. P. CATALYSTS
UNISOL TREATING
U. O. P. INHIBITORS

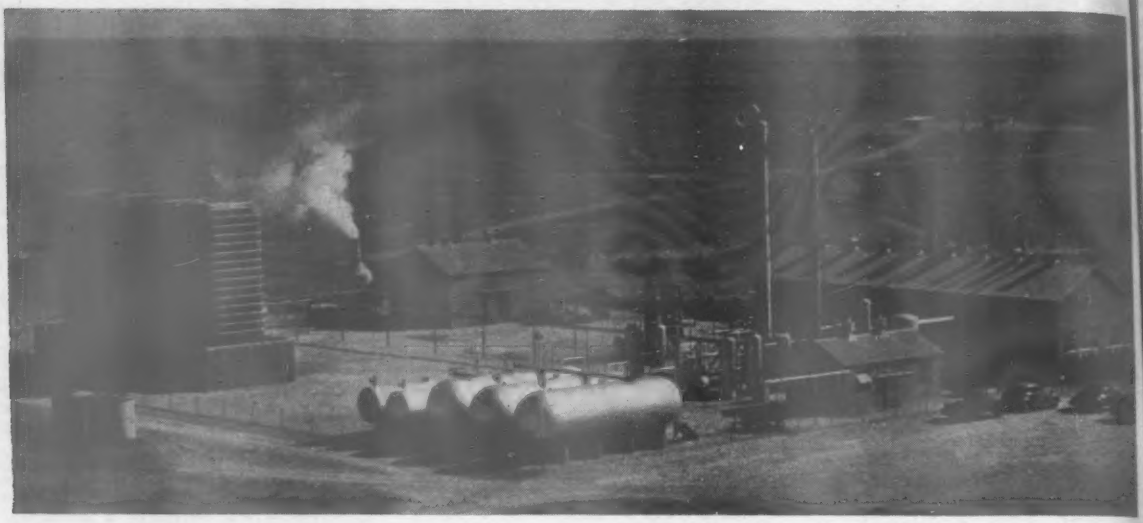
Universal Oil Products Co.
Chicago 4, Ill., U. S. A.

UOP

Petroleum Process Pioneers
For All Refiners

The Refiners Institute of Petroleum Technology

Copyright 1945, Universal Oil Products Co.



This plant, installed, owned, and operated on a basis determined by each operator's oil production, ultimately may be responsible for the recovery of 14,000,000 bbl. of additional oil from the Maljamar pool. Total investment in plant, lines, and injection wells involved in final program may be $2,000,000. A desulfurization unit has been added since the picture was taken, and other additions are to be made in the near future

Maljamar Cooperative Repressuring Project Covers Many Operational Phases

by Kenneth B. Barnes

In 3 years of operation: the gas is being gathered, desulfurized, compressed, dehydrated, and returned at 1,600 psi. to 13 gas-input wells. The producing formations are responding satisfactorily to the repressuring. Stabilized natural gasoline and butane are being manufactured, sweetened by solid cupric chloride treatment, and sold at the plant loading rack.

TEN independent producers in the Maljamar pool of western Lea County, New Mexico, are operating a cooperative gas-repressuring project which deserves careful attention of the industry. In organization and scope, Maljamar exceeds other injection-recovery projects elsewhere in the country as to number of operational phases embraced. The Maljamar project may be a forerunner of a new approach to developing and producing pools of moderate size and of the internal-expansion type.

While some mistakes admittedly were made in the initial period, these were corrected as the causative factors came to light. Several shortcuts and bypasses are now known to the operators which would have eliminated trouble and reduced final investment. These positions, however, are understandable in that several of the operations faced had not been met before, and actual experience had to be developed. Further, all of the work was planned, the physical equipment installed, and operations commenced, in April 1942, during the press of the war period.

Uniqueness of the Maljamar program, and the reason for terming it a possible forerunner of a new type of production operation for small pools, springs from the "extras" that the operators installed and performed over the ordinary run of producing equipment and practices. As to the selection of a supplemental recovery process, there was no water available for injective purposes for pressure maintenance or water driving, if that method had been desirable. As to gas input, such projects are usually inexpensive and

without risk if an existing natural-gasoline plant is handy from which residue gas is available, perhaps not even requiring additional compression. No gasoline-manufacturing concern, however, was interested in making an independent investment in a plant at Maljamar because it did not appear it would be profitable. The oil operators, therefore, built a plant, but one designed primarily and specifically as a facility for recovering additional crude oil. Gasoline manufacture was secondary, although the returns from that source have been enough to defray almost all of the plant operating cost.

Conditions at Start

Here is what had to be faced at the start of the repressuring program: The gas was sour, with 435 grains of H_2S per 100 cu. ft.; the gas to be gathered was very lean, having only 1 g.p.m. gasoline content, and the volumes per 40-acre well were very small; four-stage compression (0 to 1,600 psi.) was needed to inject the gas; proper distribution of the returned gas had to be made throughout the pool. The latter problem, for the input wells, required much geologic and formation study because there are nine different pay zones at Maljamar. Cost for initial facilities sufficient to start operation totaled several hundred thousand dollars.

These results have been achieved in 3 years: The gas is being gathered, desulfurized, compressed, dehydrated, and returned at 1,600 psi. to 13 gas input wells. The producing formations are responding satisfactorily to the repressuring. Many of the oil wells are being flowed by automatic time-cycle controllers. All wells operate on definite producing period each day to minimize gas-oil ratios and maintain uniform gas flow to the plant. Stabilized natural gasoline and butane are being manufactured, sweetened by solid cupric chloride treatment and sold at the plant loading rack.

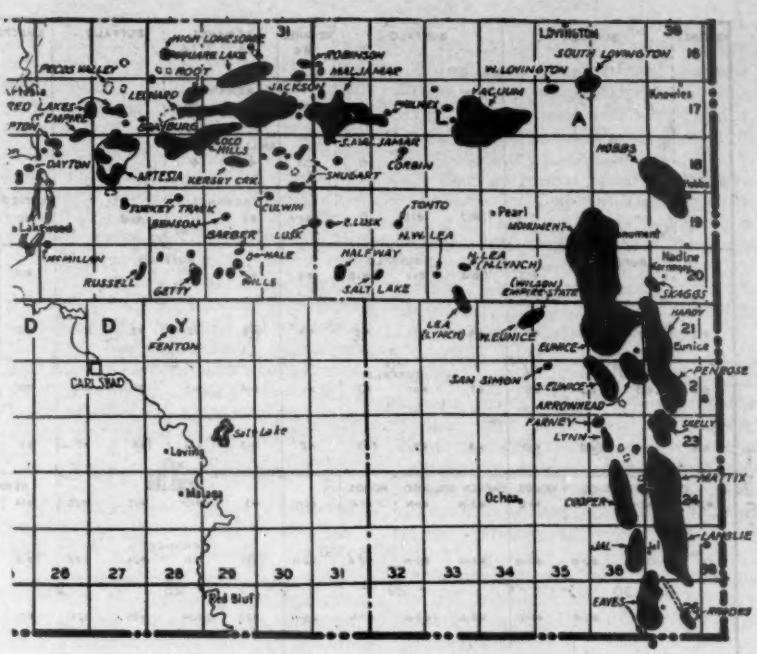


Fig. 1—Map of the New Mexico fields showing location of the Maljamar pool on the Artesia-Vacuum trend. (Courtesy E. C. Jacobson Oil Field Maps)

All of the foregoing has been found necessary to the basic goal of returning gas to the producing formations and recovering more oil. In the program the leaseholds were not unitized, but all of the oil producers own a share in the gas-gasoline facilities, and function in the pool-wide operation. Objectives and regulations are set forth and agreed to by each in a contractual instrument titled, "Maljamar Cooperative Repressuring Agreement."

The organization has an operators committee, an executive committee, a full-time superintendent, employs 13 men and maintains 12 field houses in connection with the gas-gasoline work. Pool studies are conducted in detail, and monthly reports issued to all of the participants. A full-time bookkeeper maintains records of the expenditures, products, sales, and prepares the billings to the various operators for their proportionate part of the expenditures each month.

In summarizing the project, belief has been that the recovery would be increased about 25 to 35 per cent on the plan followed. On the basis of the accomplishments of the initial phase for the first 3 years, the operators have just authorized a major expansion of the project. Plant capacity will be increased 50 per cent by adding an 800-hp. compressor, so that more residue gas can be injected and the oil and gas recovery increased still more.

Largest single expenditure will be for additional input wells because reservoir studies indicate the need for more intensive and uniform distribution of the gas injection. In meeting this need, the different producers have agreed to drill 34 new injection wells, about 23 during 1945 and 11 in 1946.

As a matter of fact, the input-well pattern will be reoriented entirely. Ten of the present 13 (shown as double circles in Fig. 2) will be reconverted to oil wells. The other three (with crosses inside) will be kept on injection. The 34 new ones will be located in individual five-spot patterns throughout the cooperative area. The five-spots themselves will

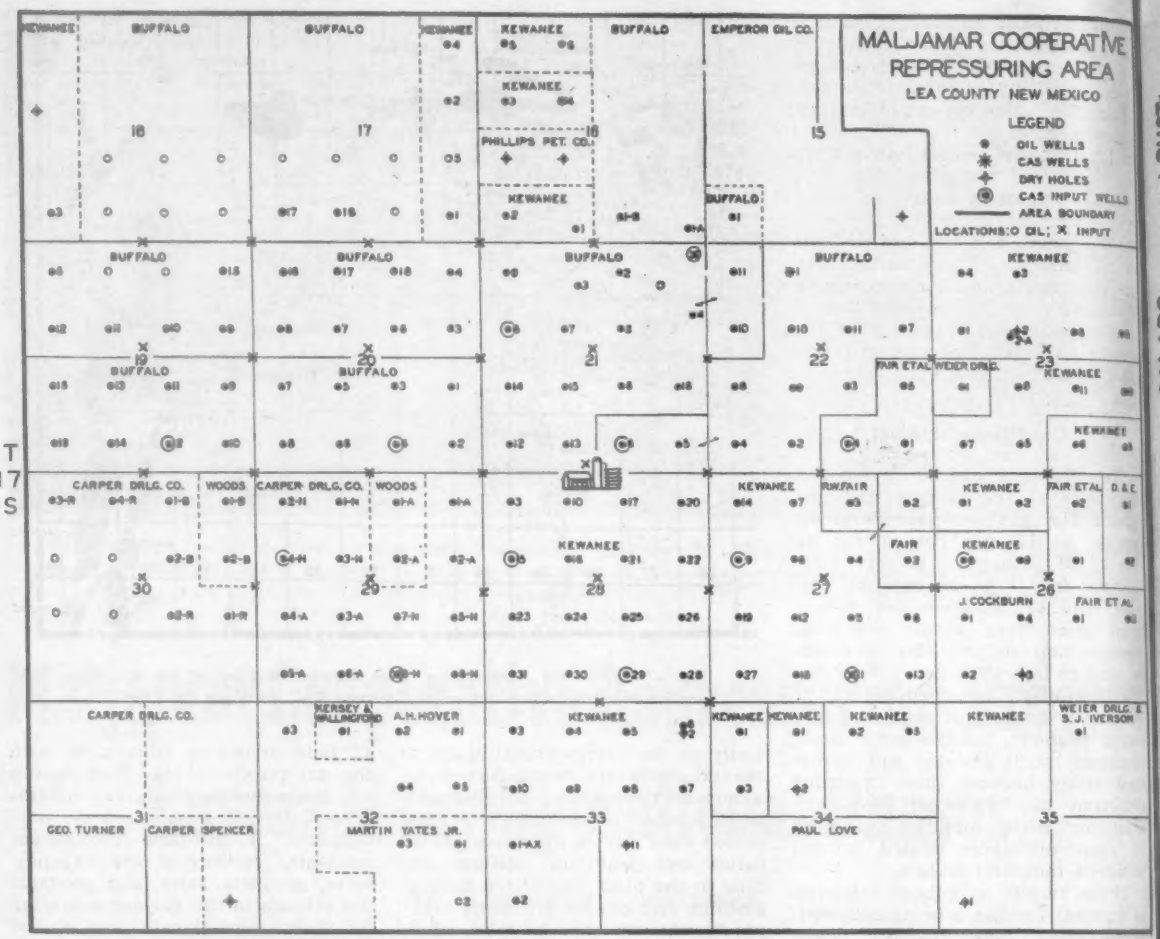


Fig. 2—Map of the cooperative area covered by the project. There are a few outside wells. Present input wells are double circled. In a revision soon to be effected in the injection procedure, 34 new input wells will be drilled at line locations shown by the crosses. Three of the present input wells (crosses inside) will be continued, the rest converted back to producers. A number of new oil wells also will be drilled

alternate, the arrangement being such that each oil well receives a "drive" from one adjacent input well. All input wells, on this program, will be located on property lines or divisions of royalty interest. A number of additional oil wells also will be drilled on some of the properties, as indicated on the map.

With the planned intensification of the gas injection and placing the action more on the basis of an out-and-out gas drive from input wells to oil wells, the operators think the additional recovery to be obtained will be considerably more than that indicated under the original plan. Certainly the present participants are cooperating fully in the plant operation, drilling of in-put wells, and all matters conducive to obtaining maximum recovery.

Geology and Productive Formations

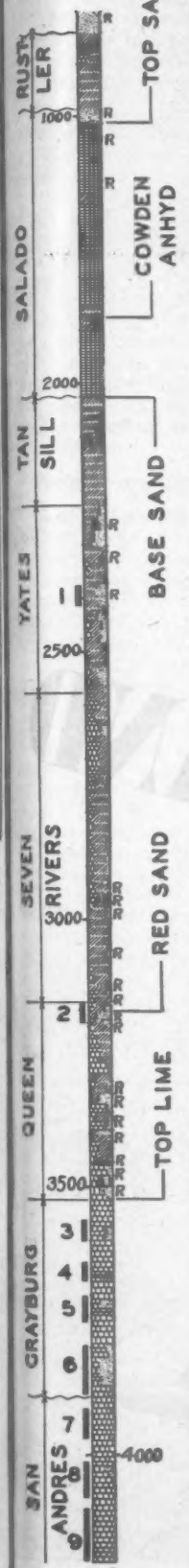
The Maljamar pool lies midway on the Artesia-Vacuum trend (Fig. 1). The discovery well was completed for 100 bbl. per day in 1926. Due to the isolated location and distance from markets, development was slow until 1939. Present development is shown by the map for the project area (Fig. 2) except for adjoining wells in Sections 24 and 25 to the east and a few to the west and south.

Structure of the pool is monoclinal, with a dip on the south flank of about 400 ft. per mile. There are some small localized closures on the feature. The surface is sandy. The underlying 800 ft. of rocks are sandstones and shales in the Doakum group of Triassic age. Below these have been penetrated the Permian beds shown in Fig. 3, as given in detail by the excellent paper by Barnett[1] on the pool.

Altogether nine different oil zones have been found in the pool. Type geologic column is shown in Fig. 3. Wells 5 and 7 in Section 21 produce oil from the No. 1 zone, located in the Yates formation. The "Red Sand" in the Queen formation, or No. 2 zone, is producing oil in six wells in the southern portion of the pool.

In the Grayburg four zones are found, and practically all of the oil wells have been cased on top of this formation. These pays are sandy dolomites, generally of low permeability, and not all of them are productive at all locations. They require shooting to increase productive capacity. Zone 6 is regarded as the best individual producer in the Grayburg section. One core from this pay has been reported[1] to have had average permeability of 50 millidarcys and porosity of 18.5 per cent. While the Grayburg zones are partly dolomitic, there are clayey phases which swell when wet so hydrochloric acidizing is not practical. This factor also precluded application of artificial water drive as a recovery procedure.

In the section of the San Andres which has been penetrated, three oil zones have been found. These are dolomites, some with sand content, and also are of tight character. Acidizing or shooting usually has been required to obtain good flowing capacity.



Although there has been some water found in Zone 6 (basal sand in the Grayburg) and Zone 9 in some wells on the south and east sides, active water influx into these, as well as the other pays, appears to range from very minor amounts in small localized areas to none at all. No free gas caps were in evidence in the pays. Further detail concerning the producing formations, reservoir character, and crude oil are given in the accompanying box on page 90.

Reason for Repressuring

It will be noted that the Maljamar crude is undersaturated with gas, bubble-point pressure being 862 psi. In passing from original reservoir pressure of 1,350 psi. to atmospheric the oil also thickens considerably, the viscosity increasing slightly more than 400 per cent. With no natural water influx into any of the pay zones and with the low porosity, low permeability, and high interstitial water content, producing the properties by ordinary pressure depletion unquestionably would have obtained but a small amount of the total oil in place. Flowing life would have been but a few months or a year or so at best, then with constantly declining rates on the pump. This type of performance is well recognized for the stated formation conditions by engineers engaged in reservoir studies. For Maljamar, moreover, definite examples and comparisons were available, which showed the low recovery, on acre-foot and other bases, in nearby similar areas.

Repressuring Agreement

The agreement, under which each of the participants joined the project, carries these essential features:

1. Purpose.—To more properly conserve the oil and gas resources of the area; to attain, by repressuring, maximum recovery; to promote economical and efficient operation.

2. Operators committee.—Comprised of one member for each operator. Function is to plan, coordinate, direct, and supervise repressuring matters. Meetings are held not less than every 3 months. Appoints annually an executive committee of three from its personnel. Purchases equipment, governs installations, selects input wells, controls injection rates and back pressures, may delegate certain authorities to the executive committee, and employs personnel.

3. Executive committee. — Is the liaison between the operators committee and the plant superintendent, pool engineer, auditor, and the operators; performs such duties as authorized by the operators committee.

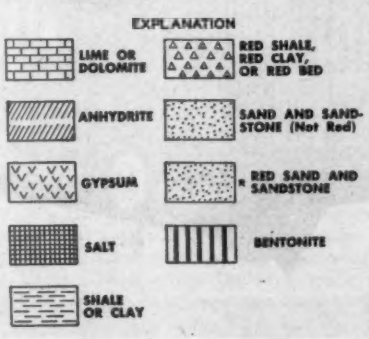
4. Inclusion of additional acreage.—Contingent upon affirmative vote of 51 per cent of the well count, which must represent not less than 33⅓ per cent of the operators.

5. Cost of plant, lines, facilities.—Shared by each operator on percentage of his oil production each month to total. Construction was financed by bank loan, with each operator assigning ⅛ of ⅞ of his oil runs for amortization; bank given mortgage on plant until loan liquidated.

6. Operating expense.—Receipts from sale of natural gasoline and butane are used for operating expenses and improvements, extensions, changes in plant, and for maintaining an operating fund not exceeding $10,000. Amounts in excess of such fund are applied to cost of plant. When plant income is insufficient to meet operating expense, each operator is assessed for any deficit, based on the ratio of his current gas production to the total gas production.

7. Input wells.—Lost revenue to the individual operators from their 13 oil wells which were converted to injection service is paid them each month, on basis of 60 per cent value of average current well allowable or actual production from the four offsetting oil wells. All of the operators join in the payment, on the ratio of their production to the total production. After the authorized new extension of the project is com-

Fig. 3—(Left) Type geologic column for the Maljamar pool, after Barnett[1]. There are nine different sections now being produced. Repressuring is confined to the Grayburg-San Andres zones



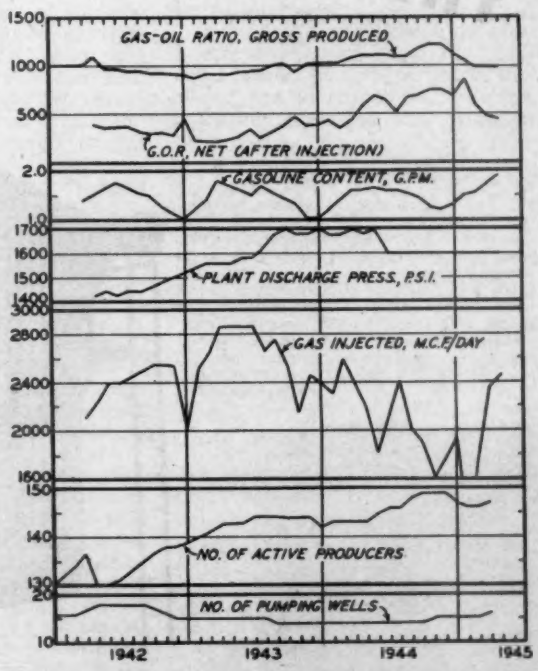
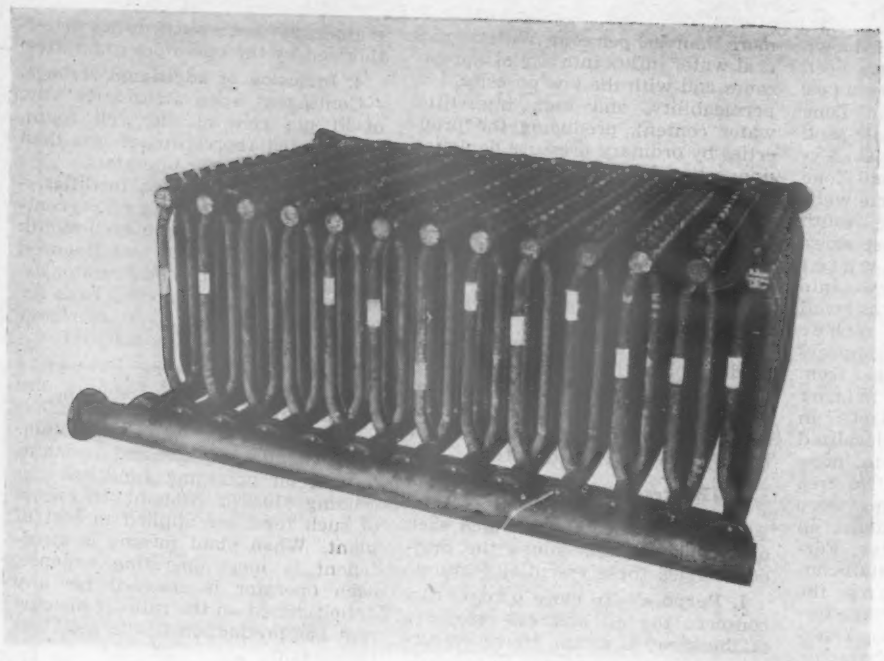


Fig. 4—Graphs of important factors concerned with the Maljamar gas repressuring. Drop in injection rate at end of 1944 due to work at plant



Labyrinths THAT LEAD TO BUTADIENE TUBES AND

pleted, these input wells, excepting three line locations, will be reconverted to oil wells, and the foregoing remuneration will cease. Cost of the 34 new input wells to be drilled will be borne exclusively by the offsetting lease owners.

8. Term.—As long as repressuring is continued. Abandonment and sale of plant depends upon 75 per cent affirmative vote of operators committee.

Over 90 per cent of the project area is public land under oil and gas lease from the federal Government, with field supervision by the oil and gas leasing division of the U. S. Geological Survey. Close contact and cooperation was had with the survey in the formative period and in continuing operations; and the project and agreement were formally approved by the Secretary of the Interior.

Performance Under Repressuring

Bottom-hole pressure and individual-well gas-oil-ratio surveys have been taken periodically during the repressuring operation. Both subsurface pressure gages and echometer tests are used in the pressure determinations. Fig. 4 gives in graphical form the trend of a number of factors pertinent to the gas-repressure performance.

A large number of isobaric, gas-oil-ratio, oil and gas production data have been prepared in both map and chart form in the project engineering office which is located in the field. A summarization of some of the key figures is given in the box on page 91.

As previously mentioned, each month the project engineer prepares a producing schedule for all of the wells. These schedules are issued to the various superintendents or foremen of the operators for their switchers and pumpers. The operators' personnel cooperate fully in the scheduling for each day. With the pressures, flow tests and gas-oil-ratio data at hand for all of the wells, this practice enables the production from each well to be fixed at rates which produce the smallest volume of gas. Care is taken, of course, that the schedules produce for each owner his full allowable. Also, importantly, the scheduling permits the capacity of the plant to be most effectively used throughout each day.

About 20 of the wells are equipped with Fisher time-cycle flow controllers. Clock mechanisms are of the 7-day type. In conjunction with the variable choke, properly set, and the flow schedule adjusted on the intermittent pilot cams, the arrangement saves mileage and permits best utilization of manpower.

New Proration Plan

At the time the gas injection was started, the 40-acre proration units received an allocation of 44 bbl. per day. Later the allowable was reduced to 34 bbl. per day. While the operators' committee was able to control the volume of gas injected into the producing formation, this flat allowable did not permit adequate control of withdrawals, an equally important phase in securing best results from the injection.

The operators' committee proceeded with a thorough study of conditions to determine an oil-allocation plan which would be equitable to all concerned and also specifically geared to the repressuring program. Representative analyses of the reservoir crude were made by Core Laboratories, Inc., and these data incorporated into the proration plan finally proposed for the Grayburg-San Andres formations. The complete plan, formally heard by the New Mexico Oil Conservation Commission, and ordered effective April 1, 1945, is:

Testing

1. Bottom-hole pressures are to be taken each 6 months; each well to be closed in 24 hours, but not to exceed 48 hours, prior to the test.

2. Each well is to be tested for gas-oil ratio at 3-month periods; gages are to be at normal production rate, with no flowing well producing through larger than a ¾-in. choke, in excess of 3 hours continuous flow, nor 4 hours intermittent flow over a 24-hour period. A pumping well is not to be produced more than 7 hours after fluid has been pumped up. All wells are to be produced at their allocated rate the day preceding test.

Allocation

3. Each well will be assigned a basic allowable of 15 bbl. per day.

4. Wells capable of producing the basic allowable, but unable to produce the additional quota assigned by the bottom-hole pressure-gas-oil-ratio factors, are termed "intermediate wells" and allowed to produce up to that shown by their production tests.

5. The remaining allowable of the field total, which is 4,500 bbl. per day, is divided among the wells in inverse proportion to the reservoir space which will be voided by them, as reflected by the bottom-hole pressure and gas-oil ratio tests. The bottom-hole sample data provided these volume factors for the full range of bottom-hole pressures and gas-oil ratios which are or may be encountered. The allowables are to be adjusted quarterly.

In a subsequent article on the Maljamar project, details of the plant and auxiliary equipment will be discussed and illustrated as to design, operating pressures and temperatures, etc.

Acknowledgment

For assistance in this article and the one to follow, both on the Maljamar Cooperative Repressuring Project, acknowledgment is made to W. V. Wright, superintendent for the Maljamar agreement; F. M. Jacobson, vice president and manager, Buffalo Oil Co.; F. D. Baker, petroleum engineer, Kewanee Oil Co.; N. C. Turner, acting chief engineer, engineering and construction division, Jones and Laughlin Supply Co., and L. S. Gregory, L. S. Gregory Co.

References

1. J. A. Barnett, "The Maljamar Pool," New Mexico School of Mines Bull. No. 18 (1942) pp. 241-249.

William J. Wright, project superintendent, has had a conspicuous part in the development of the Maljamar program. He started with the organization June 15, 1942, as pool engineer, and was promoted to his present position 2 years later. His performance of the manifold duties, and the results accomplished, have been warmly commended by Kewanee, Buffalo Oil, Carper Drilling, and the other participants in the gas-repressuring program at Maljamar.

Graduating from Louisiana State University in 1928, Wright has had an interesting and varied career in production and secondary-recovery work. He was with Humble from 1928 to 1932 at Yates and Hobbs, first as petroleum engineer, and later as production superintendent, and served on the pool engineering committee at both places. From 1932 to 1937 he was with Standard of Jersey in the Pendopo field, Palembang district, Sumatra, on a pressure-maintenance program. En route back to the States, he observed the machinations of the Nazi regime at first hand during a 3-week stay in Germany, and he was in Vienna at the time Austria was "annexed." At Houston he became a partner in Tyler Construction Co., and built oil-field and compressor-plant installations before starting with the Maljamar project.

Joe Gillen, formerly in the production department of Atlantic Refining Co. at Seminole, Okla., has been made district scout at Shawnee, Okla.

D. M. Grubbs, formerly geologist at Jackson, Miss., for Shell Oil Co., Inc., has joined Danciger Oil & Refining Co. at Fort Worth as assistant chief geologist.

Left: Completing the "running in" of the inside cutting tool on the small-size operating drill pipe. The top connections are being made, such equipment including a special small swivel and a small size kelly safety cock

Above: With rotation accomplished by chain tongs and backup post in rotary table, operator slowly puts weight upon the cutting tool. Progress of cut is determined by watching weight and torque indicators. Too much weight usually means excessive torque, which "winds up" the operating pipe too much. Successful cut is indicated by several observations—the previously strained fish jumping, mud backs up from casing —a change either way, in torque

Problems Encountered in Cutting And Fishing Below 13,000 Ft.

by E. H. Short Jr.

THE development and subsequent dissemination of data pertaining to the various methods employed in getting out of trouble at great depths are even more important to drilling progress than the exchange of ideas concerning the technique employed in arriving at these depths. To safely bottom a hole at extreme depth, in excellent drilling time, with a minimum expenditure, to within a few feet of the objective, only to be hindered by stuck pipe which may cause months of delay, or even complete loss of the hole, are plus and minus conditions which leave a negative accomplishment.

Despite extreme care in drilling, close observance of mud, and the exercise of all known precautionary measures, stuck drill pipe continues to occur too frequently. Since there seem to be no rules which if followed will absolutely guarantee the completion of a deep well without trouble due to stuck pipe, the development of ways and means of getting out of such trouble appears extremely important.

During the recent drilling of one of the deepest Gulf Coast wells, the drill pipe became stuck. The drilling of this particular well might be characterized by the extreme precautions which were taken to prevent stuck drill pipe. Yet, while the mud was under constant treatment and inspection and while returns were continuous, this trouble occurred.

After applying all the usual methods for releasing the pipe, including the lubrication of the hole with oil in the mud, it was soon evident that it would be necessary to clean the hole by cutting out the drill pipe.

In order to accomplish the removal of the stuck drill pipe, two types of cutting tools, one operating from the inside and other the outside, were used at successive stages of operation. Because of the initial condition of the drill pipe extending from the surface to the bottom of the hole the first cut was made with the inside cutting tool.

It was necessary therefore to run this tool to a depth of over 13,000 ft. on the bottom of "little inch" consisting of 2⅜ in. and 1¼ in. drill pipe. In determining the point to make the first cut, or the depth to which the free portion of the drill string extended, a study of the Schlumberger survey was necessary. This survey indicated a shale section at about 13,000 ft. and it was decided to make the first cut at this point. It should be mentioned that when such subsurface data are not available, the fishing-tool operator can usually determine the free portion by taking a strain on the drill pipe and then calculating the length of the free portion by the amount of stretch obtained.

The inside cutting tool is composed of friction blocks that are in constant

Left: Top of first (inside) cut is beveled. After cutting almost completely through, the prestrained pipe pulled apart as indicated by outer ring on face. Examination of the wear on knives after withdrawal indicates penetration of cutting points into the fish

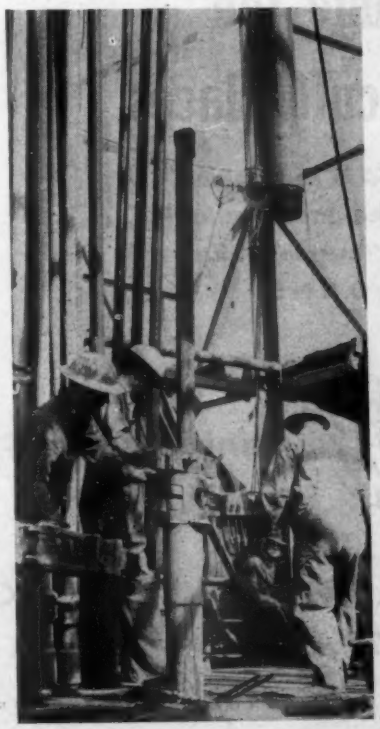
Center: The lower portion of an outside cut. This portion is beveled while the upper part is practically flat. This part becomes the top of the fish on the next try and the gashes shown are tool marks made on the following run

Outside cutter after withdrawing from hole. An oversized guide is run on bottom to aid "going over" the fish which is "topped" in a washout of hole

contact with the inside walls of the fish, slips that expand on a tapered mandrel when released by a rotation, and knives that are forced into the fish through the action of a wedge. This tool is capable of operating at any desired place in the string.

With the tool at the depth selected, rotation of the operating pipe causes: (1) the friction blocks to function by tending to prevent the outer sleeve, which contains the blocks and slips, from turning; (2) it tends to unscrew the bottom, or nose piece, which is attached to the stem of the tool. After no more than three or four revolutions of the rotary, the slip and friction block sleeve is free from the stem and a downward movement of the operating pipe allows the slips to expand on the tapered mandrel. This action forces the teeth of the slips to bite into the walls of the fish, thereby setting the tool. Cutting operation begins by lowering the operating pipe still further, until the wedge arms force the cutting knives into the walls of the pipe. This is a very delicate operation and requires gentle application of weight to prevent fracture of the knife points. After the cutting tool begins to take weight, rotation accomplishes the cut.

The first attempt at freeing the drill pipe in this well was unsuccessful. With the cutting tool operating at this depth, it is most difficult for the usual indications of a successful cut to be observed on the rig floor. Although the usual required time of operation for completing the cut had been consumed, no positive reactions of the success of the cut were in evidence. The only alternative was to remove the tool from the hole and take a strain on the fish. When the fish failed to release after a pull exceeding 300,000 lb. had been applied, it was evident that the drill pipe was stuck higher in the hole or that the cut had been unsuccessful.



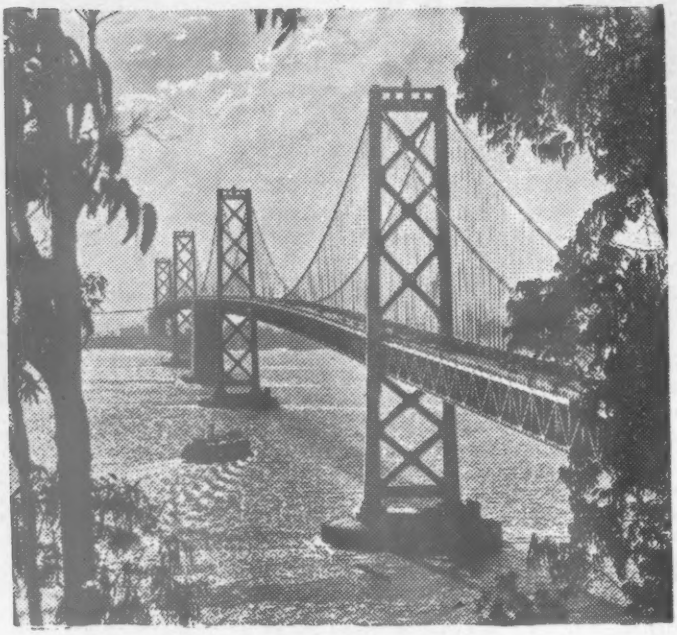
"Stripping out" after bringing a successful cut to surface. It is necessary to remove drill-pipe fish from wash pipe by this method. The overshot within outside cutting tool catches under bottom tool joint and brings fish to surface

The successful initial cut was made at a depth of approximately 10,000 ft. After setting the tool and rotating for some time, two sure indications of success were observed on the surface. One was the fact that the operating pipe, instead of the fish, gave a sudden upward motion. The second indication was the mud back flow over the fish. These were definite signs and presented the Houston Oil Field Material Co., Houston, operator with assurances enough to warrant the usual wager of a new hat that the cut had been successful.

After the removal of the free portion of the fish, the necessary guides, cutting tools, etc., were then run on the recovered drill pipe. Before the outside cutting tool can be run into the hole, it is usually necessary to condition the mud, locate the top of the fish by feeling, get over the fish and wash a section free for cutting. It should be mentioned that before running the outside cutting tool, an ordinary core bit was run and spotted 60 ft. above the top of the fish. Mud was conditioned at this point by circulation. The next step involved running a rotary shoe into the well on the bottom of approximately 300 ft. of wash pipe.

After considerable difficulty in getting over the top of the fish, ap-

Look Ahead With First National



For Oil Financing to bridge the most difficult places

FIRST OF TULSA is recognized throughout the Industry as the Bank for "business-like" OIL LOANS

Golden 1895 1945 **Anniversary**

THE FIRST NATIONAL BANK AND TRUST COMPANY OF TULSA

MEMBER FEDERAL DEPOSIT INSURANCE CORPORATION

proximately 300 ft. was washed over, followed by the withdrawal of the shoe from the hole. Only 300 ft. of wash pipe was used in this particular case because of the extreme depth of the operation and the hazardous condition of the hole. The outside cutting tool was then run in on the bottom of the wash pipe.

While the inside cutting tool may be set at any desired point, the outside tool is dependent upon a shoulder of a tool joint for its setting and operation. The outside tool is comparatively simple, consisting of an outer body with three knives hung in slots at 120° to each other, and an inner assembly, called an overshot. This overshot catches with an u · means of leaf springs or flippers under the tool joint and forces the knives over a wedge. This action causes the knives to protrude inward, shearing their retaining pins and allowing the cutting points to bite into the outer walls of the fish.

The diameter of the hole in which this operation took place was 7⅞ in. and the outside diameter of the tool joints washed over were 5 in., so that extreme care was necessary to prevent sticking of the wash pipe itself. Generally the time of operation required in cutting the fish with the outside tool is much less than that required for the inside cutter. The tool operator must have skill as well as a good imagination of the action taking place below the surface. Should the fish be topped in a washout portion of the hole, the operator must rely upon certain indications to tell him whether or not he is over the fish or alongside. After finding the fish with the bottom of the tool and rotating slowly, an increase in mud pump pressure plus a decrease in the number of strokes per minute of the pump indicates that the opening of the tool is restricted by the passage of the fish.

If these indications are not present, it is very probable that the tool is alongside. As the cutting tool continues over the fish, it is possible that a reduction in weight may be evident as the overshot of the tool passes each tool joint. After lowering the tool a distance equal to the amount of wash pipe above it, a sure indication of being over the fish is obtained by setting the swedge (between the wash and drill pipe) upon the top of the fish. This is indicated by the reduction of weight upon the line scales.

In accomplishing th· outside cuts of the fish in this ·.ell, it was often necessary to make two or three trips with knuckle joints, over-sized guides, and other tools to center the fish in the washed-out portion of the hole before the outside cutting tool could successfully locate and envelope it.

this isn't news

Peacetime octane numbers of regular and premium grade motor fuels are expected to rise sharply as a result of wartime refining developments.

this IS news

Cycloversion gasoline of superior quality is being produced at costs which compare favorably with thermal cracking.

here's why

Cycloversion utilizes an inexpensive rugged catalyst, a fixed bed method of operation and long process cycles. These factors result in premium gasolines at low utility and labor costs.

...and best of all

Cycloversion, because of its simplicity in process and design, requires only moderate investment. Small and medium size as well as large capacity units are assured of early investment return. Cycloversion may be the answer to your peacetime refining problems. Perco engineers will gladly review the economic application of Cycloversion to your operations.

PROCESSES • ENGINEERING

PERCO

RESEARCH • CONSTRUCTION

A Division of

PHILLIPS PETROLEUM COMPANY, Bartlesville, Oklahoma

Penetron Quickly Determines Steel Thickness—Also, Without Connection to Liquids, Finds Levels and Densities

A NEW tool which will be of much interest and importance in oil production, refining, pipe-line activities, to the petro-chemical and process industries, and to industry in general, is now ready to go to work. Many varied applications for routine and constant service duties are possible. The instrument is known as the Penetron.

By means of the new development now available, it is possible to rapidly and accurately acquire inspection data by determining the thickness of steel or any other solid, metallic or nonmetallic. Thickness of walls of surge drums, reaction chambers, towers, pipes, pressure vessels and the like, may be quickly and inexpensively measured by simply placing the device at the desired location on the surface on only one side. Whether this surface is the inside or the outside of the object does not matter. No mechanical measuring, calipering, drilling or "feeling" operations are involved.

As if this accomplishment is not "magic" enough, the method also is capable of determining the levels and densities of liquids contained in vessels, tanks and pipes without connection of any mechanical linkages or electrical wires to the liquid. The Penetron equipment makes use of electronic and radioactivity principles.

The Penetron was invented by D. C. G. Hare, a physicist employed by Texaco Development Corp. Patents were first applied for in 1939. In its original form, Penetron was mounted on truck and trailer, weighed close to 400 lb. and required two men to operate it. Dr. Gerhard Herzog, who was at that time engaged in research and measurement of cosmic rays with Dr. A. H. Compton, at University of Chicago, joined Texaco Development Corp. to engage in development and research on Penetron. His work not only increased the effectiveness of the instrument and brought into being many new applications but also resulted in reducing the size to an approximation of its present 40-lb. weight. For use by industry, the equipment will be exclusively manufactured and sold by Engineering Laboratories, Inc., Tulsa. It seems natural for the latter concern to have been selected for the manufacture and sale of the new product because the firm has had much experience in gamma ray work. In 1937, this company developed, in its laboratories, and introduced "well logging by radioactivity", which is now in wide use, in all oil fields, and, in itself employs gamma ray intensity measurement, which is also the fundamental principle of Penetron.

Radioactivity well logging and Penetron utilize the same principle of bombarding matter with penetrating radiations and measuring the intensity of "back-scattered" or returned rays. In Penetron, as the thickness of the subject matter increases, or becomes denser, the back-scattering of the gamma rays becomes greater. Recording of these back-scattered rays are interpreted by calibrated curves for the known material, resulting in accurate measurement of thickness and in disclosing evidence of unseen corrosion, pits, flaws and incipient fractures.

Before entering into a more detailed description of the new apparatus and its manifold utility, a brief explanation of the constitution of radioactivity, gamma rays, and the associated relationships, is in order.

Radioactivity is a property possessed by certain elements such as radium, uranium and thorium from

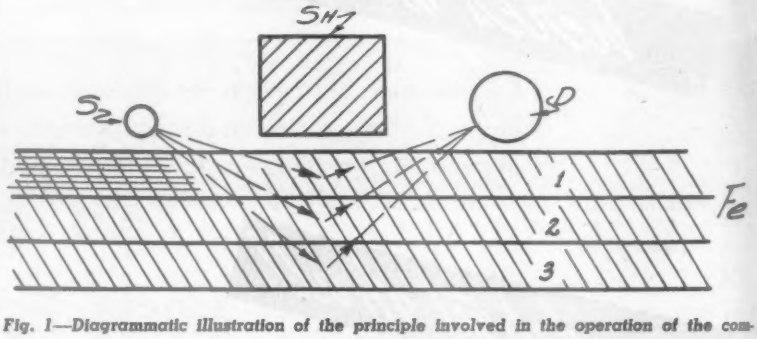


Fig. 1—Diagrammatic illustration of the principle involved in the operation of the company—E.I.I. Penetron

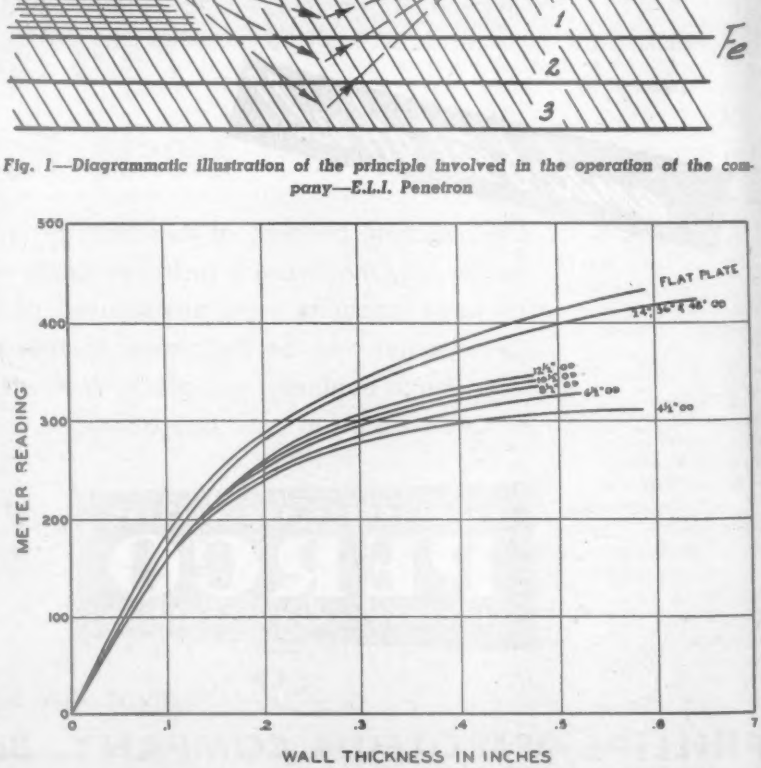


Fig. 2—Calibration curves for iron plate and tube—outside measurements

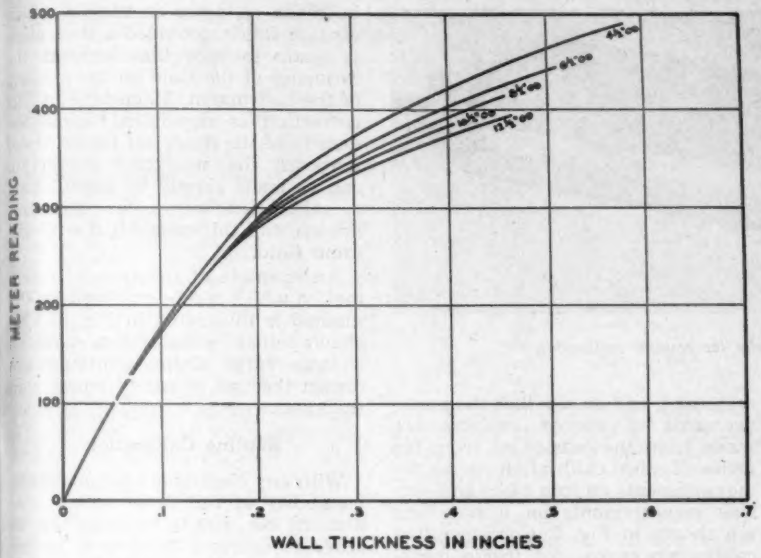


Fig. 3—Calibration curves for iron tubing—inside measurements

which alpha, beta or gamma rays are spontaneously emitted by the disintegration of the nuclei of atoms. Madame Curie was responsible for the discovery of radium, the best known radioactive element, and which is several thousand times as active as uranium. There are many different elements that display radioactive properties, but most of them are only feebly radioactive.

Gamma rays travel with the velocity of light and consist of electromagnetic radiation. In fact, they are radiant energy. Most important to the discussion which will follow, concerning the Penetron, is the fact that gamma rays are not deflected by magnetic and electrical fields, and the fact that gamma rays have greater penetrating power than either beta or alpha rays.

Principle of Operation

Source of the gamma rays employed in the Penetron is a needle containing 1 milligram of radium in the form of a commercially available salt. The source is surrounded with a shield containing a window which shields the beam of gamma rays. Thickness and design of the shield were arrived at after a careful study of the allowable dosages of gamma rays to which the average individual may be exposed without any physiological effects.

The simple principle upon which the Penetron operates is illustrated diagrammatically in Fig. 1. The shaded layers numbered 1, 2, and 3, represent adjacent layers of a homogeneous wall, say of iron or steel, the thickness of which is to be measured. Penetrating gamma rays emerge from the radioactive source S, impinge on the wall, and penetrate into it. A portion of the rays passes through the wall and emerges on the opposite side. These rays serve no useful purpose and are disregarded.

Another portion of the radiation is scattered in all directions by the atoms which make up the wall. Some of these scattered rays emerge on the same side of the wall from which they originally entered. It is this particular portion of the radiation, termed back-scattered radiation, which is utilized for measuring wall thickness.

By measuring the intensity of the back-scattered radiation with detector D, it is possible to determine the thickness of the wall, since for any given composition, the intensity of the back-scattered radiation increases as a direct function of the wall thickness. In order that this measurement be made with a high degree of accuracy, it is necessary to set up the source of radiation, the wall, and the detector, in accordance with a predetermined geometric arrangement. The block Sh shown in the drawing is employed as a shield to prevent radiation from the radioactive source falling directly on detector D.

Radiation picked up by the detector creates current discharges which are amplified and integrated to produce a direct current. Amount of current produced is measured by means of an indicating microammeter. Readings obtained on the microammeter are directly indicative of wall thickness.

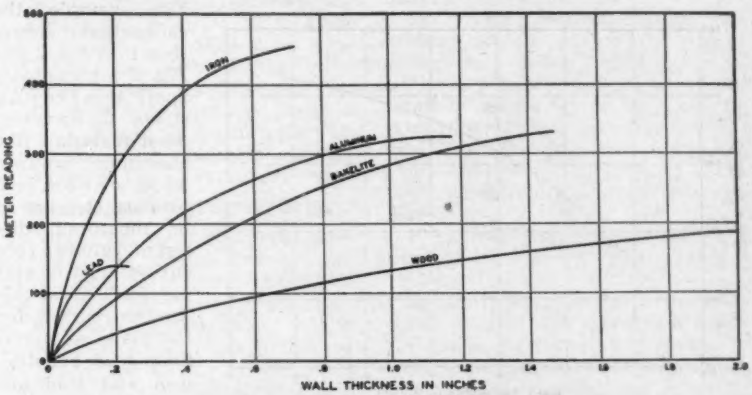


Fig. 4—Typical calibration curves for various materials—in flat plate form

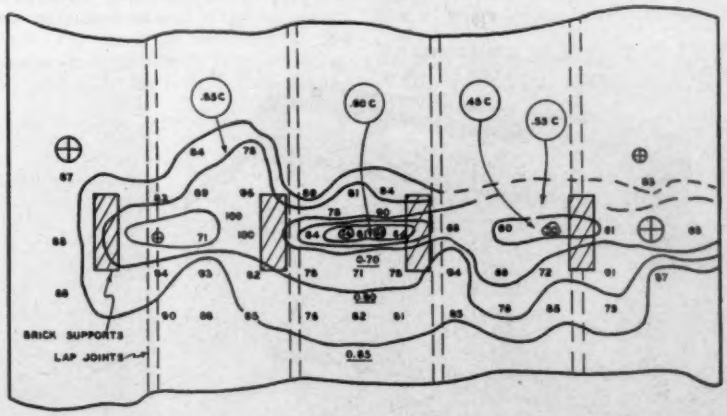


Fig. 5—Surge-drum wall-thickness measurements—bottom of drum as seen from inside—measurements made from outside. Figures show measured wall thickness in hundredths of an inch

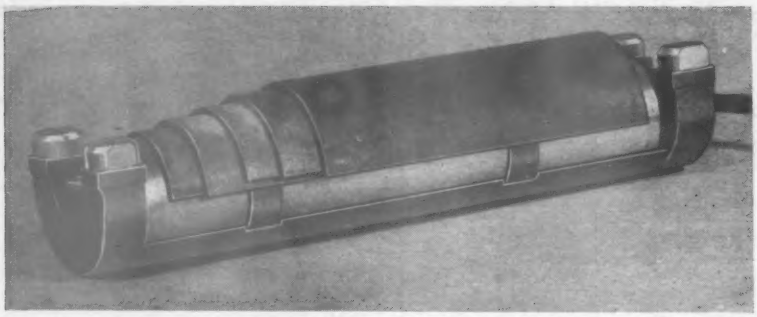
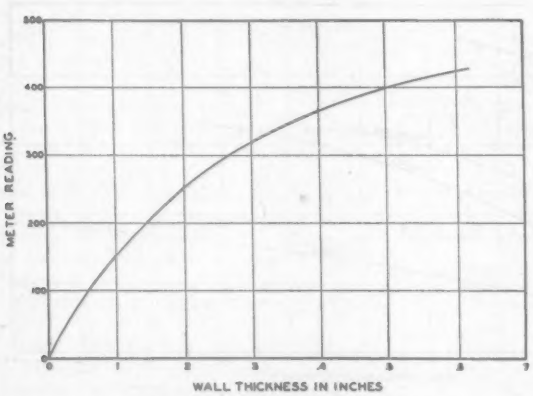


Fig. 6—Concentric steel shells for routine calibration

Determination of Wall Thickness

To convert the readings of the microammeter into wall thicknesses in inches, the instrument is calibrated on specimens of tubing, pipe, and flat plates having known wall thicknesses. From these data calibration curves are derived. Because the geometrical relationship between the measuring head and the wall changes with the curvature of the wall, it is to be expected that the calibration curves for a wall of a given composition will vary, depending on the diameter or curvature of the wall or vessel being measured, and on whether the measurements of curved surfaces are made from the outside or from the inside. Typical calibration curves for measurements on iron plate and outside measurements on iron tubing are shown in Fig. 2. Corresponding calibration curves for inside measurements on iron tubing are shown in Fig. 3.

Calibration curves have to be established only once and are considered as part of the equipment. The curves are not affected by small changes in the chemical composition of the material comprising the wall. For example, the calibration curves shown in Fig. 2 and Fig. 3 for iron also apply to alloyed steels. If, however, other materials like aluminum, brass, wood, ceramics, plastics, etc., are to be measured, different calibration curves must be employed. Typical calibration curves for flat plates of aluminum, good, bakelite, iron and lead are shown in Fig. 4.



STANDARD CALIBRATION CURVE FOR CONCENTRIC SHELLS

Fig. 7

Wall thickness measurements can be made on pipes or vessels which contain fluids, provided a correction is made to take into account the influence of the fluid on the reading of the instrument. Magnitude of this correction is dependent upon the density of the fluid, but for practical purposes the necessary correction can be made simply by establishing a calibration curve for pipes of known wall thickness filled with the same fluid.

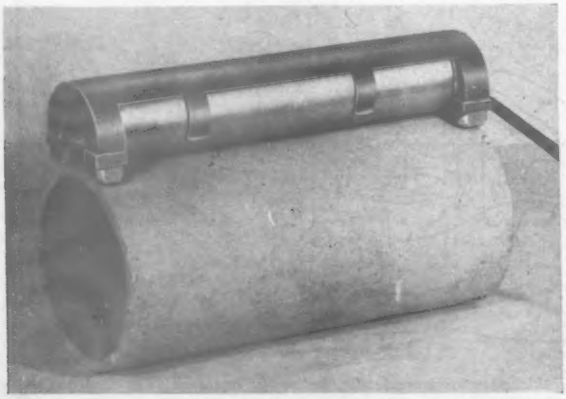
An example of the type of information which can be obtained by the method is illustrated in Fig. 5. This shows actual measurements made on a large surge drum. Contours are drawn through points of equal wall thickness.

Routine Calibration

With any electronic equipment the possibility of failure of tubes, condensers, etc., has to be expected. In order to detect a failure, or rather simply for "checking", a simple means is provided whereby the overall performance of the instrument can be ascertained. For this purpose, a set of concentric half-round steel shells (Fig. 6) and a calibration curve (Fig. 7) for these standard shells are used with the instrument. By measuring the thickness of the standard shells, the performance may be checked at any time. Equipment failures of any type will be reflected by a deviation from the standard calibration curve.

Time Required for Measuring

The individual pulses of current created in the detector do not follow each other at regular intervals, in fact, the rate of emission of gamma rays by radium is quite irregular. It follows certain statistical laws and fluctuates around an average value. Accuracy with which this average value can be determined experimentally increases as the time of observation is increased. Consideration along these lines lead to the establishment of a minimum time for any measurement in radioactivity in



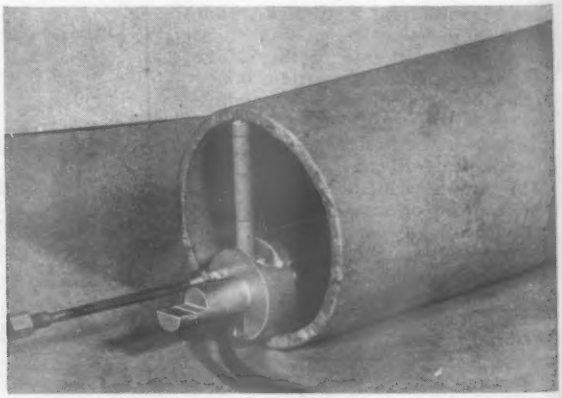


Fig. 8—(Left) Head in position in magnet-type holder. Fig. 9—(Right) Head in position in pneumatic type holder—for inside measurements

TABULATION OF PENETRON RESULTS WITH CALIPER MEASUREMENTS

Tube, position or point No.	Penetron position No. 1	Penetron position No. 3	Average	Caliper	Difference
Battery 71—Heater Tubes					
Tube No. 2	.452	.547	.499	.490	.009
Tube No. 3	.507	.507	.507	.500	.007
Tube No. 4	.497	.517	.507	.500	.007
Tube No. 5	.527	.487	.507	.490	.017
Tube No. 9	.452	.517	.484	.490	.006
Average of 30 tests:	.484	.481	.483	.497	.014
Battery 71—Heater Section Tubes					
Tube No. 53	.491	.491	.491	.490	.001
Tube No. 55	.510	.510	.510	.500	.010
Tube No. 67	.511	.471	.491	.500	.009
Tube No. 70	.491	.481	.486	.480	.006
Tube No. 75	.483	.481	.482	.490	.008
Average of 71 tests:	.476	.478	.477	.481	.004
Tank 19310					
Middle of top plate	...	...	.155	.150	.005
Top of 6th ring plate	...	...	.085	.080	.005
Top of 5th ring plate	...	..	.115	.100	.015
Top of 4th ring plate	...	...	.135	.150	.015

Tube, position or point No.	Penetron position No. 1	Penetron position No. 3	Average	Caliper	Difference
Tank 19310					
Top of 3rd ring plate	...	...	.135	.150	.015
Top of 2nd ring plate	...	...	.202	.200	.002
Top of 1st ring plate	...	...	.265	.280	.015
Battery 40—Various Lines					
Point No. 143	...	...	.510	.500	.010
Point No. 156	...	...	.552	.550	.002
Point No. 148	...	...	.520	.500	.020
Point No. 151	...	...	.549	.550	.001
Point No. 161	...	...	.554	.570	.016
Point No. 164	...	...	.577	.580	.003
Point No. 177	...	...	.535	.550	.015
Battery 44—Flow-Line Bends					
Point No. 168	...	...	.58"	.57"	.01
Point No. 169	...	...	.63"	.60"	.03
Point No. 171	...	...	.53"	.53"	.00
Point No. 180	...	...	.56"	.57"	.01
Point No. 183	...	...	.58"	.57"	.01

order to achieve a required accuracy. In the case of the equipment described, minimum time for each reading is 25 seconds.

In actual field work it has been found that it is easily possible to make measurements at 150 or more points during a working day.

Limitation and Accuracy

Referring to Figs. 2, 3, and 4, it will be seen that the calibration curves have a steep slope for the smaller wall thicknesses but tend to flatten out with increasing wall thicknesses. From these curves it will be seen that the Penetron can be used for measuring iron or steel walls up to approximately 0.75-in. thickness. For other materials the limit is different, for example, for aluminum the limit is approximately 1 in. With available accessory equipment, there is no practical limitation to wall thickness of tubing. These limitations are due to the fact that the penetrative power of deflected or scattered gamma rays is less than that of the primary rays, and rays which are deflected beyond a certain depth are completely absorbed before reaching the surface as back-scattered radiation.

An abridged tabulation of a series of measurements of different equipment by the Penetron is given in the accompanying table, together with those obtained by mechanical calipering. An important point to remember in the comparisons is that the mechanical caliper determines thickness at only a single small point, whereas the Penetron averages the thickness over an area of approximately 1 sq. in.

Accuracy of the instrument has been established by conducting hundreds of experiments with specimens of unknown wall thickness. After determining the thickness by means of the Penetron, the specimens were then drilled and calipered mechanically. By this method the accuracy has been found to be within plus or minus 3 per cent.

Experimental work involving the substitution of a neutron source and detector for the gamma ray source and detector has indicated that wall thicknesses up to 4 in. of steel can be measured with a high degree of accuracy.

The Penetron measures the average thickness over an area of approximately 1 sq. in. For this reason it cannot be used for the detection of pin holes or pin-hole type corrosion.

The method will not differentiate between the component layers of laminated construction. It measures the total thickness and not the thickness of any one layer. If, however, a laminated wall is composed of, say, two layers of different materials, the procedure can be used to measure the thickness of either layer provided the thickness of the other layer is known. In this case the thickness of the unknown layer is determined as the difference between the total thickness and the thickness of the known layer.

Determination of Liquid Levels

If the head of the instrument is placed on the wall of a vessel partially filled with liquid and above the level of the liquid, the amount of back-scattered radiation will be due entirely to the wall of the vessel, since the density of the air or vapor in the vessel is substantially negligible by comparison with the density of the material comprising the wall. If the head is moved down along the wall of the vessel, the reading of the instrument will remain constant until it reaches a point opposite the level of the liquid in the container. At this point the microammeter will indicate an increase in the amount of back-scattered radiations, due to the fact that the radiation passing through the wall is scattered not only by the wall but also by the liquid in the vessel. By noting the point on the wall of the vessel at which an increase in reading is obtained, it is possible to locate the level of the liquid. Likewise, the interface between two fluids of different densities can be located from the outside of a container without actual access to the interior of the container.

By proper instrumentation the method may be adapted to control as well as to locate liquid levels. In addition a continuous record of the location of the levels may be obtained by employing a recording device. The following are specific examples of some of the types of liquid level measurements which may be made:

1. Determining and controlling the catalyst level in catalyzed chemical reactions.
2. Controlling levels in process units, such as the solvent-oil interface in a solvent refining tower.
3. Gaging liquids in storage tanks.
4. Gaging liquefied gas in cylinders.

These constitute, however, only a few of the possible applications.

Determination of Gravity of Fluids

All penetrating radiation is, to a

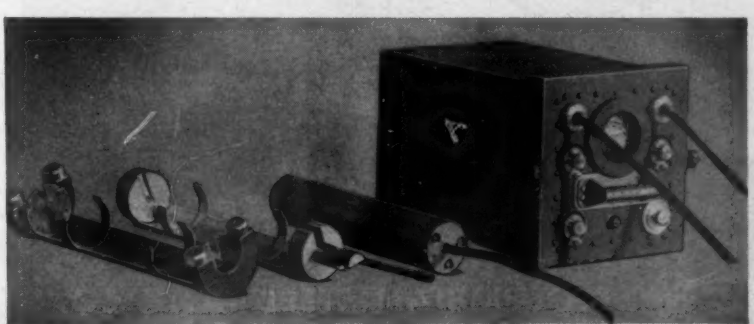


Fig. 10—Control box

certain extent, scattered or diffusely reflected by the material it traverses, and the degree of scattering is a function of the number of electrons encountered by the penetrating rays in their passage through the material. Since the total number of electrons present in a unit volume of any substance is closely related to the density of that substance, it is apparent that the amount of scattering per unit volume is largely dependent upon the density of the material. Therefore, as the density of the material increases the amount of back-scattered radiations detected by the Penetron also increases and, for practical purposes, the device measures density. For this reason, the density of a fluid inside a container may be determined without actual access to the fluid itself.

In experimental work with the instrument located on the outer wall of a container having a wall thickness of 0.3 in., it was found possible to check the specific gravities of fluids having values of between 10° and 75° Baume with a high degree of accuracy.

A few typical examples of operational applications which may be made, based on the determination of the specific gravity, are:

1. Routing the flow of oil in pipe lines.
2. Specific gravity of liquids in tankage.
3. Determination and control of proportions of reactants in chemical processes.
4. Control of blending operations in which two materials of different densities are mixed.
5. Determination of density of a substance without the necessity of sampling or without actual access to the material.

Makeup of Equipment

The Penetron consists of two main parts: the head and the control box. The head contains the radiation source, the detector, a shield between the two, and a preamplifier; altogether weighs approximately 10 lb. It is connected by a cable to the control box which contains the measuring circuit and the power supply.

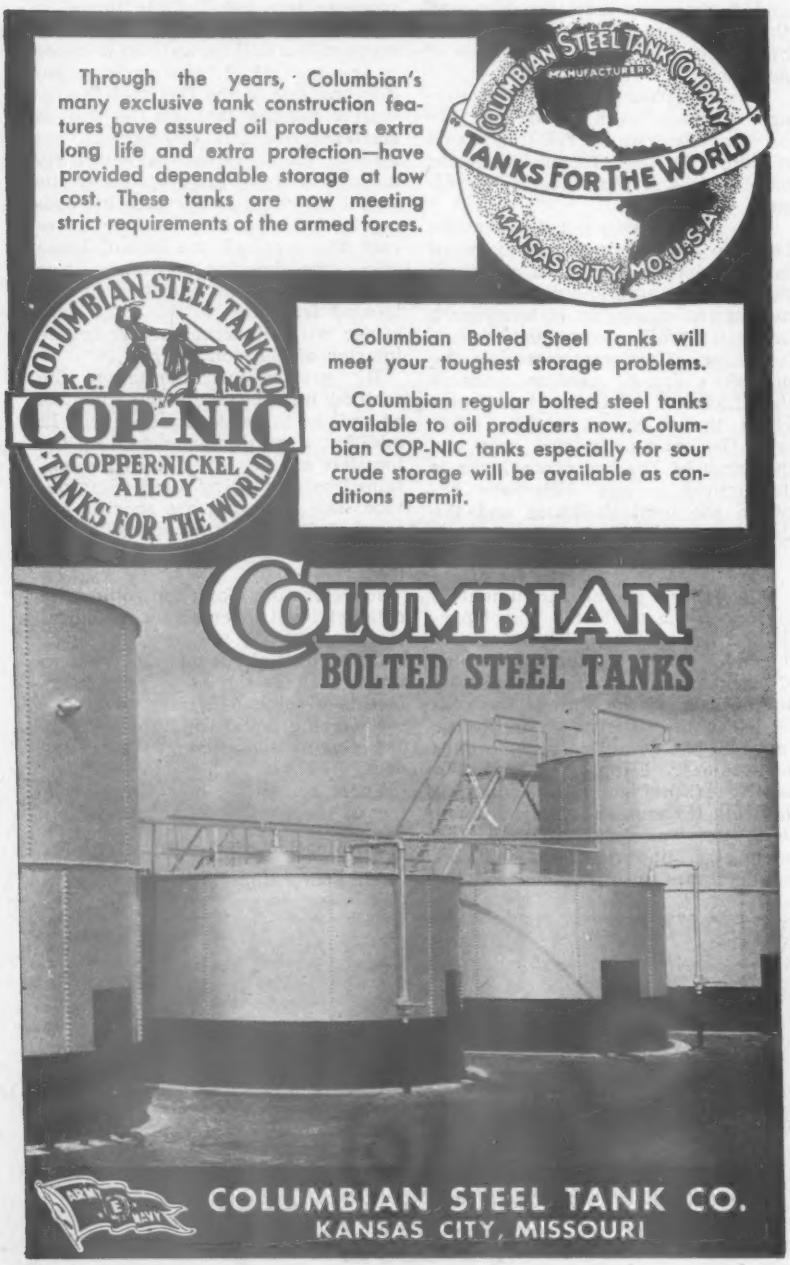
Head.—The head proper consists of steel tubing 2½ in. in diameter and 13 in. in length. It can be inserted in various holders. One holder (Fig. 8) is equipped with two permanent magnets which serve as supporting points for the head and at the same time serve to hold the head firmly in position on iron or steel surfaces.

If measurements are to be taken on the inside of pipes, the pneumatic type holder of Fig. 9 is used. It is equipped with two pistons which can be moved by compressed air or fluid pressure. The pistons press the head against the inside of the pipe in any desired direction. The clamp is maneuvered by extension handles, and measurements can be made at any point along the inside of the tube.

Radiation source.—The instrument uses only 1 milligram of radium as the gamma ray source. The radium is supported at the apex of a cone-shaped element, the base of which is attached directly to the housing of the detector. This cone serves to shield the detector from direct radiation emanating from the radium.

Life of the radium source is practically unlimited. It takes 1,690 years to reduce the quantity of gamma ray emission to one-half of its original value.

Detector.—In the Penetron, a high efficiency counter of special improved design is employed, contained in a housing fitted longitudinally into the head, and shielded so that it is open to radiation coming from one side only. The open or unshielded side faces the wall to be measured. Back-scattered radiation from the wall being measured enters the detector through the unshielded area and sets off current discharges or pulses in the detector. Rate at which these pulses of current are generated is proportional to


Through the years, Columbian's many exclusive tank construction features have assured oil producers extra long life and extra protection—have provided dependable storage at low cost. These tanks are now meeting strict requirements of the armed forces.
COLUMBIAN STEEL TANK COMPANY
MANUFACTURERS
TANKS FOR THE WORLD
KANSAS CITY, MO. U.S.A.
COLUMBIAN STEEL TANK CO.
K.C. MO.
COP-NIC
COPPER-NICKEL ALLOY
TANKS FOR THE WORLD
Columbian Bolted Steel Tanks will meet your toughest storage problems.
Columbian regular bolted steel tanks available to oil producers now. Columbian COP-NIC tanks especially for sour crude storage will be available as conditions permit.
COLUMBIAN
BOLTED STEEL TANKS
COLUMBIAN STEEL TANK CO.
KANSAS CITY, MISSOURI

the intensity of the radiation entering the detector, which in turn is a function of the wall thickness.

Preamplifier. — Pulses of current produced in the detector are extremely small. Since these pulses must be transmitted through a length of cable it is necessary that they be increased in magnitude sufficiently to be distinct when they are picked up at the measuring circuit in the control box. This function is performed by the preamplifier located in the head of the instrument.

Control box and electrical circuit. —The control box (Fig. 10), containing the measuring circuit and the power supply, is constructed of lightweight metal and is vapor proofed. It is 16½ in. long by 9 in. wide by 7½ in. in depth, and weighs approximately 25 lb.

Amplified pulses of current are transmitted from the head through the cable to the control box. Here they are further amplified and by means of a special electrical circuit are integrated to produce a direct current, the magnitude of which is proportional to the number of current pulses created per unit of time in the detector by the back-scattered radiation. The current is measured by a microammeter located on the face of the control box. By proper calibration against standard specimens of known thickness, as already discussed, the readings obtained on the microammeter are readily converted to the wall thickness of the object being measured.

Power supply.—The instrument is designed to operate on 110 volt 60 cycle alternating current. By means of a suitable power supply circuit, the line voltage is transformed and rectified for the operation of the electronic circuits. Total power consumption is approximately 100 watts.

The application of Penetron is not restricted to the petroleum industry as its field of application is as wide as industry itself. Some of the practical applications are inspection of boiler tubes, liquid-gas containers, pressure vessels, acid tanks, continuous inspection and control of tube and pipe production, and all instances where, for considerations of production or safety, it is desired to accurately determine variations in dimensional thickness of matter, or to determine variations in density of liquids or to determine liquid levels in sealed containers where introduction of a mechanical float is not practical.

The minimum time required for each reading on the instrument is 25 seconds. In actual field tests it has been found that it is easily possible to make measurements at 150 points during a working day.

K. S. Adams, president of Phillips Petroleum Co., is to make a tour of Latin-American areas preliminary to the opening of offices by Phillips in Caracas, Venezuela; Bogota, Colombia, and Mexico City.

J. W. Emison, vice president and treasurer of The Texas Pipe Line Co., Houston, has been elected to membership in Controllers Institute of America, devoted to improvement of controllership procedure.

W. O. Butler, formerly district drilling foreman in the Coastal district for Union Oil Co. of California, has been promoted to divisional production superintendent. His former position has been filled by promoting **Frank Gess,** formerly drilling foreman at Bakersfield.

Maj. Frank E. Hangs, formerly employed by The Texas Pipe Line Co. in Houston, has been named chairman of the American military petroleum committee for China and is in charge of the longest pipe line in the world. This line is delivering gasoline to China from ports in India. Major Hangs, who holds a master of science degree from University of Illinois, will correlate estimates for oil-product needs in the China theater and give technical advice.

On the double!

Newest machine . . . developed especially for J-M by Crutcher-Rolfs-Cummings of Houston . . . effectively alternates two coats of enamel and two layers of asbestos felt for the first time.

THIS J-M machine double-coats and double-wraps pipe lines—gives dual protection in one cost-saving operation.

In recent months, this ingenious machine has double-coated and double-wrapped hundreds of miles of pipe lines for that extra protection against severe corrosive conditions.

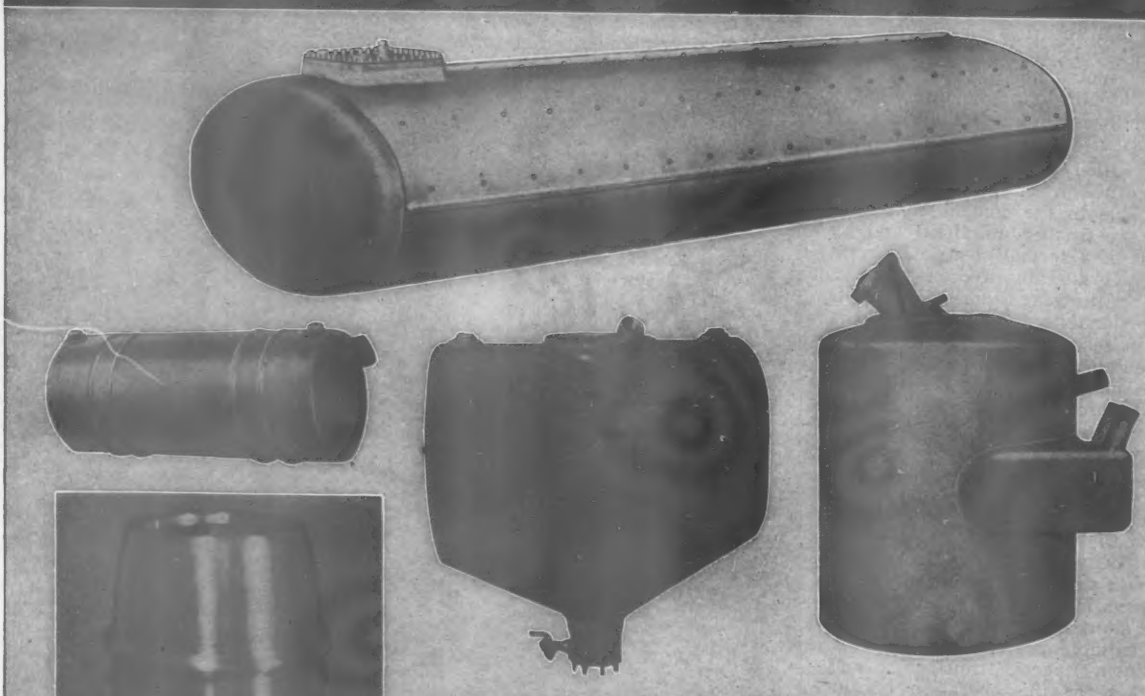
Johns-Manville has pioneered both in the manufacturing of asbestos wrappings . . . and in the means of their mechanical application. Asbestos felt—most widely used material for pipe wrapping . . . guards against soil stress and distortion.

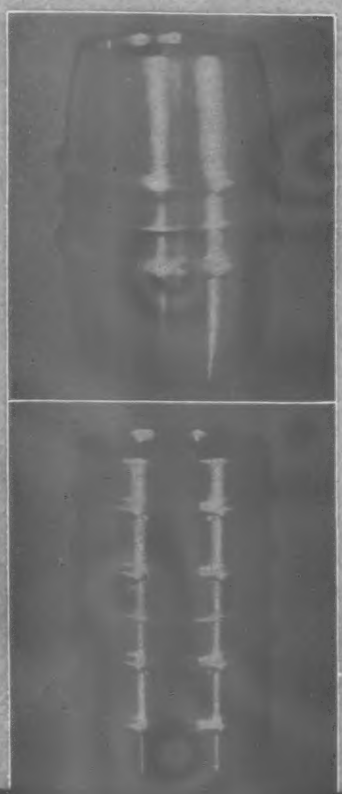
Do the job better—in less time

For full details on how the J-M Coating and Wrapping Machine and J-M Asbestos Pipe Line Felts can guard your own lines against corrosion—and save you time and money in your pipe-wrapping operation—write Johns-Manville, 22 East 40th Street, New York 16, N. Y.

JM PRODUCTS Johns-Manville *Asbestos* Pipeline Felts

FUEL-OIL-GAS





ENGINEERS AND MANUFACTURERS
OF PRODUCTS FOR THE

OIL-GAS AND PETROLEUM INDUSTRY

IN

ALUMINUM
MAGNESIUM
COPPER-BRASS
STAINLESS STEEL

Containers and Equipment for Natural Gasoline — Naphtha — Distillate — Kerosene — Diesel Oil — Fuel Oil — Road Oil and Lubricating Oil.

Complete engineering knowledge and modern facilities for the production of aluminum and stainless steel barrels, tanks and containers as illustrated above make the Benson Manufacturing Company the best source of equipment supply to the gas, oil and petroleum industry.

KANSAS CITY, MO. **BENSON** 18TH & AGNES

TANKS IN ANY SIZE — FOR EVERY PURPOSE

EQUIPMENT FOR THE OIL, GAS AND PETROLEUM INDUSTRY

QUESTIONS on TECHNOLOGY

by W. L. Nelson
Consulting Engineer

Dilution Ratio Tests for V. M. & P. Naphtha

We are contemplating the manufacture of varnish makers and painters solvent at our refinery. On your Table 13 of Petroleum Refinery Engineering are given dilution ratios of butyl acetate and ethyl acetate. Will you please direct us to the procedure for making these determinations? Is it not true that V.M.&P. is a loose term covering various solvents of different boiling ranges, the specifications for which lie solely with the individual consumer?—A.H.M.

The Questions on Technology page of April 15, 1943 (p. 134) shows that some manufacturers have furnished materials as low boiling as 105-260° F., whereas others (or other purposes) have called for a boiling range as high as 350-455° F. Much the same range is required in cellulose lacquer diluents and in paint removers or paint solvents. This lack of consistency in specifications is justified by the fact that there are many kinds of paints, varnishes, and lacquers; the coatings are applied in many ways, particularly with respect to rate of drying or ease of application; the petroleum naphthas are used in various proportions along with other organic solvents; and because the naphthas may be used as thinners, solvents or vehicles.

If the naphtha is to be used with acetate or other organic solvents, it should not cause the precipitation of the gum, resin, nitrocellulose, etc., that may be employed and hence dilution ratios or tests of many varieties have been developed. Perhaps most widely used is the Kauri-Butanol test, but for naphthas that are to be used as lacquer diluents or thinners, the nitrocellulose dilution ratio employing butyl acetate is also widely used. This test is described in "Physical and Chemical Examination of Paints, Varnishes, Lacquers and Colors" 1937 Ed. of H. A. Gardner (Inst. of Paint & Varnish Research, 2201 New York Avenue, N. W., Washington, D. C.) A modification of his Method II is: Ten grams of a nitrocellulose solution are weighed into a 125-cc. glass-stoppered Erlenmeyer flask. The solution is prepared by dissolving 3 parts by weight of bone-dry ½-sec. nitrocellulose in 7 parts by weight of normal butyl acetate. Dry nitrocellulose is explosive and hence it is advisable to make a stock solution rather than to repeatedly handle the dry gun cotton. The solution should be tightly stoppered and kept in the dark. An additional 1.2 cc. (1 g.) of acetate is added and 15 cc. of the thinner undergoing test. The mixture is shaken, and successive 1-cc. portions of the thinner are added and shaken until finally the small globules of separated cotton just fail to dissolve. In the test as outlined here, a total of 8 g. of butyl acetate is employed, 3 g. of cotton is in the mixture, and hence the weight of solvent added is equal to the total weight (at "cotton final") less 11. Thus, if the final weight of the mixture is 21 g., the amount of thinner added is 21 minus 11 or 10 g., and the dilution ratio is 10 divided by 8, or 1.25. For high-solvency naphthas the "additional" 1.2 cc. of butyl acetate may be omitted, and for paraffinic naphthas it is advisable to add 2 or 3 extra grams of acetate. These modifications assist in keeping the final percentage of cotton in the mixture at about 10 per cent, a concentration that is common in many commercial operations. Similar tests (including the use of ethyl acetate) are described in Thomas H. Durran's book entitled "Solvents," which is a monograph of the applied chemistry series published by Chapman & Hall.

Important tests for all V. M. & P. or diluent naphthas are color, doctor, odor, sulfur, distillation range or evaporation rate, and corrosion. In addition to these, varnish thinners should have high Kauri numbers and paint thinners should have some solvency power for Kauri gum. Varnish thinners and lacquer diluents should have a low aniline point and the diluent should have a high nitrocellulose dilution ratio. Although the distillation range of thinners ranges widely, the most common ranges are 190-330° F. (usually referred to as V. M. & P.) and 300-430° F. (often called mineral spirita). The first of these is a rapid-drying thinner and the latter requires a slower drying rate. In addition certain narrow-boiling range V. M. & P. naphthas (280-380° F.) are used because of their high flash point.

This department was created for the purpose of aiding managers, superintendents, engineers, chemists and all those engaged in various phases of plant operation, as well as those connected with the marketing and utilization of petroleum products. Readers are invited to submit their problems to W. L. Nelson, technical editor. Inquiries must be signed, but only the initials will be printed.

New Refinery Processes

I find it difficult to keep abreast of the many new processes that have been developed during the war, such as:

Isomerization	**Dehydrogenation**
Alkylation	**Dehydro Aromatization**
Reforming and Hydroforming	**Codimer**
Catalytic Cracking	**Hydrocodimer**
Polymerization	**Cumene**
Hydrogenation	**Alkylate (light and heavy)**

I shall appreciate if you can tell me (1) a definition, (2) feedstock, (3) catalyst used, (4) reaction, (5) operating conditions, and (6) products, for each process.—P. L.

This question should be useful to many technical men and hence Table 1 (next page) is presented which will help in relating the many new processes to one another. No such chart can be extremely complete and hence reference should be made to at least the following:

1. Van Winkle, Matthew — Aviation Gasoline Manufacture, Chaps. V and VI, McGraw-Hill Book Co., 1944.

2. Nelson, W. L.—Petroleum Refinery Engineering, second edition, Chaps. XVIII and XXIV, McGraw-Hill Book Co., 1941.

3. Refinery Processes, The Oil and Gas Journal, pp. 170-216, March 31, 1945.

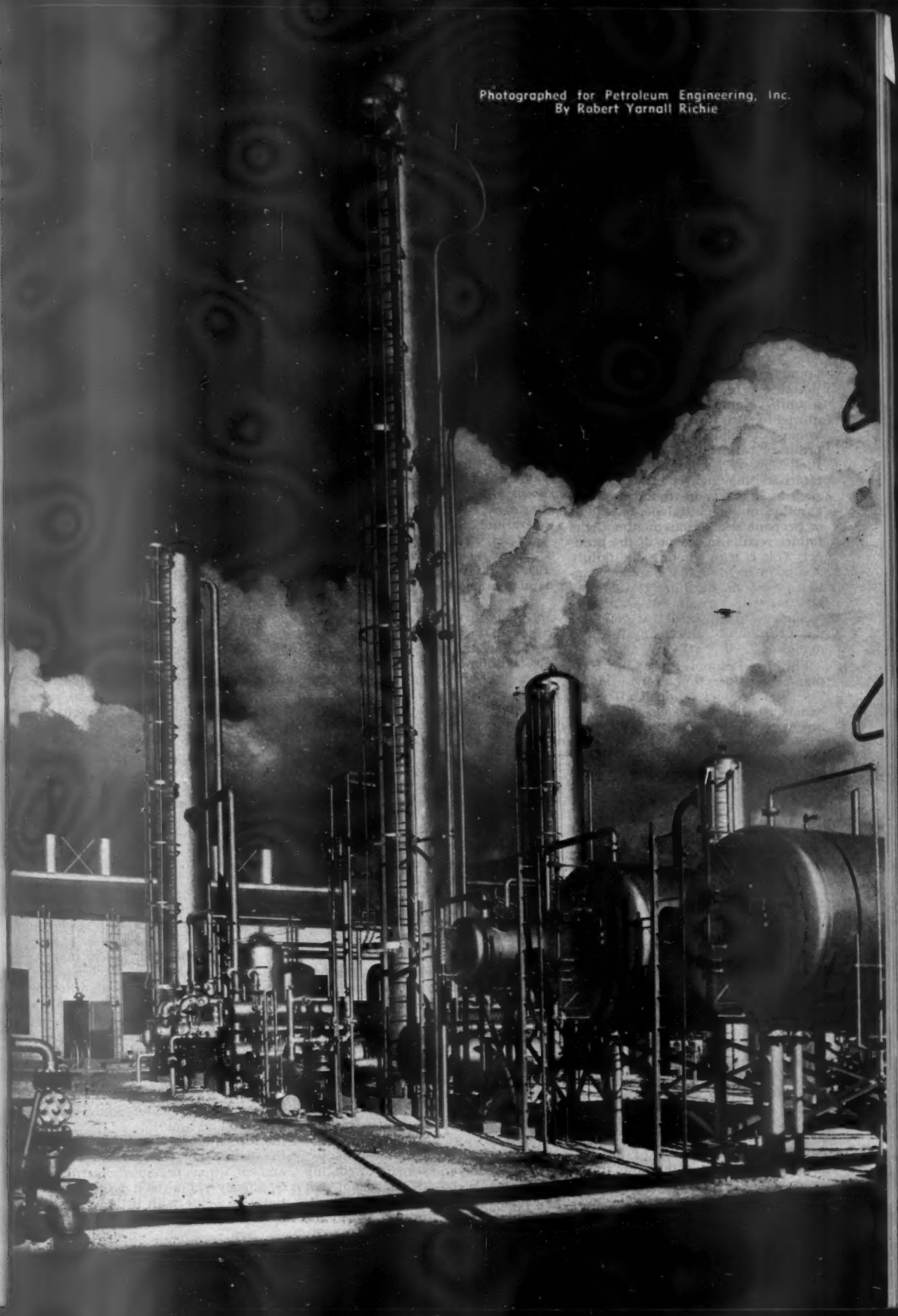
Only a few of the most common processes can be indicated here. Particularly with respect to the chemical changes listed in Column 2, it is possible to give numerous illustrations. Thus, dehydrogenation, thermal decomposition, hydrogenation, polymerization and alkylation may be applied to literally hundreds of hydrocarbon compounds. Likewise, many other commercial processes might have been selected for Column 4. Most of the processes are not simple and hence the items listed under purposes (Column 6), products (Column 7), and catalysts (Column 10) must be considered as general conclusions which in no way preclude the possibility of other illustrations or usages. With respect to operating pressures (Column 9), it must be stated that pressure in the reaction chamber or zone may be of little significance because higher-pressure equipment may be required in other auxiliary parts of the plant.

TABLE 1—SUMMARY OF MODERN REFINING PROCESSES

1. Molecular change	2. Kind of physical or chemical change	3. Energizer-catalytic or thermal	4. Commercial name of process	5. Common feedstock	6. General purpose	7. Main product	8. Illustrative reaction	9. Operating conditions† Psig.	Temp., °F	10. Catalyst
Disintegration (breaking into parts)	Desulfurization	Catalyst	Catalytic desulfurization	Gasoline	Remove sulfur	Gasoline	$R(SH) = R + H_2S$ (hyd. sulfide)	40- 70	700- 800	Bauxite or clay
	Dehydrogenation	Catalyst	(No common name)	Butane	Make olefin	Butene or butadiene	$C_4H_{10} = C_4H_8 + H_2 = C_4H_6 + 2H_2$	low	850-1,150	Chromic oxide on bauxite
	Decomposition	Thermal	Viscosity breaking	Reduced crude oil	Reduce viscosity	Fuel oil	$C_nH_{2n+2} = C_{n/2}H_{n+2} + C_{n/2}H_n$	320-320*	820- 880	
	Decomposition and adsorption (catalytic cracking or reforming)	(?)	Houdry catalytic cracking	Light gas oil	High octane number	Catalytic gasoline		20- 30	900- 960	Natural clays, aluminum hydrosilicates, bauxite, etc.
			Fluid catalytic cracking	Light gas oil	High octane number	Catalytic gasoline		2- 5	860- 900	
			Thermofor cata. cracking	Light gas oil	High octane number	Catalytic gasoline		10- 15	790-1,000	
			Cycloversion	Light gas oil	High octane number	Catalytic gasoline		80-100	900-1,100	
Several (both disintegration and synthesis	Decomposition and polymerization (cracking)	Thermal	Thermal cracking	Topped crude oil and gas oil	Make gasoline	Cracked gasoline		300-700*	880- 900	
			Reforming	Topped crude oil and gas oil	Make gasoline	Cracked gasoline		400-800*	900-1,000	
			Coking	Topped crude or fuel oil	Eliminate fuel oil	Cracked gasoline		300-500*	880- 900	
	Decomp., polymerization and alkylation	Thermal	Polyforming	Naphtha and refinery gas	Increase gasoline yield	Gasoline		1,000-2,000*	1,030-1,120	
	Decomposition and hydrogenation	Catalytic	Hydroforming	Naphtha or distillate	Aromatic gasoline	Solvents		200	900-1,050	(?)
		Catalytic	Destructive hydrogenation	Many stocks	Paraffinic stocks	Many	$C_nH_{2n+2} + H_2 = 3C_{n/3}H_{n+2}$, etc.	3,000	800- 930	Molybdic trioxide, etc.
	Dehydrogenation and rearrangement	Catalytic	(No common name)	Heptane and methyl cyclohexane	Aromatic hydrocarbons	Toluene	$C_7H_{16} = C_7H_8 + 4H_2$	low	1,020	Chromic, molybdic, etc., oxides
	Polymerization and decomposition	Thermal	Thermal polymerization	Cracking-still gases	Recover gases	Poly gasoline	$C_3H_6 + iC_4H_8 = C_7H_{14}$	1,500-2,000	900-1,025	
	Alkylation	Catalytic	HF Alkylation	Iso and normal butane	High-octane blending stock	Alkylate	$iC_4H_{10} + iC_4H_8 = C_8H_{18}$	100-150	70- 115	Hydrofluoric acid
		Catalytic	Sulfuric acid alkylation	Iso and normal butane	High-octane blending stock	Alkylate	$iC_4H_{10} + iC_4H_8 = C_8H_{18}$		30- 90	Sulfuric acid
		Catalytic	(No common name)	Propene and benzene	High-octane blending stock	Cumene	$C_6H_6 + C_3H_6 = C_9H_{12}$	100-600	350- 550	Phosphoric acid
		Catalytic	(No common name)	Ethene and benzene	Needed for styrene and synthetic rubber	Ethyl benzene	$C_6H_6 + C_2H_4 = C_8H_{10}$	15	180- 210	Aluminum chloride
		Thermal	Thermal alkylation	Ethene or propene and isobutane	Recover gases	Neohexane	$C_2H_4 + iC_4H_{10} = C_6H_{14}$	3,000-8,000	900-1,000	
Synthesis (uniting)	Hydrogenation	Catalytic	(No common name)	Codimer (trimethylpentene)	High-octane blending stock	Isooctane	$C_8H_{16} + H_2 = C_8H_{18}$	15- 60	320- 400	Nickel
	Polymerization	Catalytic	Phosphoric acid poly.	Cracking-still gases	Recover gases	Poly gasoline	$2,3\ (C_3H_{6n}) = C_{9n}H_{18n}$	300-1,000	300- 450	Phosphoric acid
		Catalytic	Sulfuric acid polymerization	Cracking-still gases	Recover gases	Poly gasoline	$x\ (C_nH_{2n}) = C_{nx}H_{2nx}$		70- 180	Sulfuric acid
		Catalytic	(No common name)	Isobutene	Intermediate stock for isooctane	Codimer	$2\ iC_4H_8 = C_8H_{16}$	350-600	300- 500	Phosphoric acid
Rearrangement (of mol structure)	Isomerization	Catalytic	Isomate	Naphtha, pentane, or hexane	High-octane gasoline	Isomate gasoline	$nC_6H_{14} = iC_6H_{14}$	120-300	150- 220	Aluminum chloride
		Catalytic	Butane isomerization	Butane	Branched-chain hydrocarbons	Isobutane	$nC_4H_{10} = iC_4H_{10}$	300-350	100- 210	Aluminum chloride

*These are back pressures held on pipe-still heaters. †In main reaction

One of numerous gas processing plants designed and constructed by Petroleum Engineering, Inc., during its 16 years of service to the industry. Petroleum Engineering, Inc. Offices: Tulsa and Houston.


Photographed for Petroleum Engineering, Inc.
By Robert Yarnall Richie

RUPTURED PIPE LINES— Preventative Maintenance and Corrective Procedures

by F. B. Neptune

The author is assistant manager of Phillips Petroleum Co.'s pipe-line department. He presented the accompanying paper at the Rubber Reserve Corp. safety meeting in St. Louis in May. He has been concerned with pipe-line problems since 1931 when he joined Phillips in the research department. He became chief chemist of the East St. Louis pipe-line terminal in 1935 and was assigned the duty of starting operation of the new products line between East St. Louis and East Chicago when it was completed in 1939. That fall he became superintendent of the East Chicago terminal.

Introduction

PUMPING highly volatile products through pipe lines, where the pipe is in good condition and the pumping equipment including auxiliaries is designed or adapted to such usage offers no particular problem. The product, being very light "pumps easy", that is, less pump pressure is required to push through a unit volume than would be required to push through an equivalent volume of crude oil, distillate or even ordinary refinery gasoline or motor fuel. However, a failure in the system handling high-volatile products such as high-vapor-pressure natural gasoline, butane, butylene, butadiene or propane is a serious matter if the failure results in escape of the product. This is true whether the failure occurs in or around a pumping station or out on the line. The volume loss may be serious but is always secondary to the actual or potential loss of life and property by fire and explosion.

Phillip's Product Pipe Line System began operating early in 1931. The first product pumped after the water test was butane. Originally the line was not equipped with scraper traps because it was believed in those pioneering days that a line handling only clean products would not require scraping. Because it was impossible to run scrapers, the butane was pumped right behind the test water. Butane in combination with residual water is a bad combination and for a while we operated a sort of ice cream line, pumping inflammable slush. The operating difficulties we encountered in those first few months were anticipated to some degree, but since butane was required for pumping station fuel there was no alternative but to get the fuel to the stations via the pipe line itself. Most stations were remote from rail heads and passable roads so that it would have been almost impossible to get butane to the stations by rail and road even if suitable tank trucks had been available. In 1939 when we built an extension of the line from St. Louis to Chicago we got butane fuel to the stations by rail and tank truck and did not put a slug of butane into that section of the line until a number of scrapers had been run behind the water and several slugs of heavier product had been pumped through to the Chicago terminal. Since 1931 we have pumped in excess of 9 million barrels of butane (1½ million barrels in 1944 alone) at pressures as high as 1,100 psi. and the operation has become routine but not unimportant in so far as alert and careful handling are concerned.

This background of 14 years' experience may, by this presentation, be helpful to those who have the responsibility of operating and maintaining pipe lines handling butadiene and related products. We have ourselves been helped and are being helped immeasurably by the experience and exchange of ideas with other pipe-line operators.

Initial Exterior Protection for New Lines

No attempt will be made here to cover this subject fully. There is no general agreement among operators as to the best method of protecting pipe lines but the literature on the subject is quite extensive.[1] Phillips practice is as follows:

Solid coat all cross-country trunk products pipe lines using either asphalt mastic or coal-tar enamel with bonded wrap.

On gathering lines or lines of comparatively short use period, a visual survey is first made of the proposed route to make an estimate of coating requirements based on visual hot spots such as rivers, creeks, road-crossing, poorly drained areas, industrial areas, etc. This allows material to be ordered and properly distributed. After ditching and before pipe is lowered a soil-resistivity survey is made. The pipe is laid bare if soil resistivity is high and no visual corrosive condition exists. The pipe is given a field-applied coating either by machine or by hand of coal-tar enamel and spiral wrap of asbestos felt if soil resistivity is low or visual hot spots are encountered.

Before coated pipe is lowered into ditch a conventional-type high-voltage holiday detector is used to locate any small and otherwise undetected breaks in the coating.

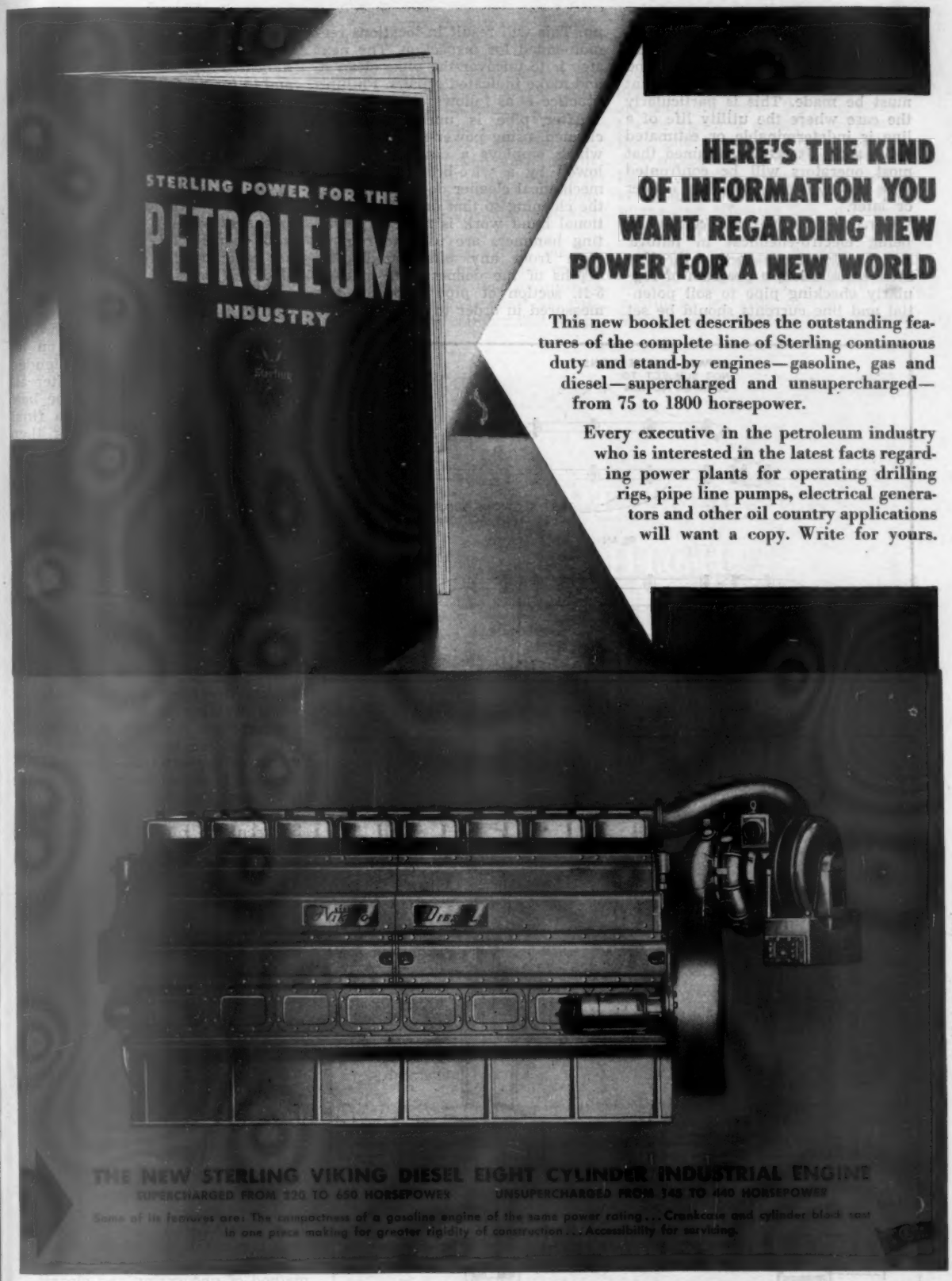
On completion of the line if there is still some question of the adequacy of the coating to protect the pipe in certain locations a survey is made with an electronic coating inspector[2] to locate the faulty coating and make repairs or install cathodic protection.

As regards cathodic protection, it has been our experience that a single energy input point will protect only 800 to 1,000 ft. of bare 8-in. pipe line through low-resistivity soil. On a thin asphalt-emulsion-coated line it is possible to protect from ½ to 2 miles with one cathodic unit. We have not used cathodic protection on asphalt-mastic-coated lines, but we are informed that one mastic-coated pipe line appears adequately protected from corrosion based on soil to pipe potential for a distance of 250 miles with only four cathodic units—over 60 miles per unit.

The amount of initial exterior protection to give a line is governed not only by soil conditions but by consideration of economics, such as expected use period, tax structure, possible earnings as related to investment, etc., and by consideration of safety such as nature of products handled, volume and pressures and nature of area through which line passes.

Preventative Maintenance—External

Preventative maintenance should begin when the line is laid, with the utilization of initial protection to the degree dictated by circumstances and conditions previously mentioned. Obviously a line well protected initially or a line with little or no protection traversing noncorrosive ter-



HERE'S THE KIND OF INFORMATION YOU WANT REGARDING NEW POWER FOR A NEW WORLD

This new booklet describes the outstanding features of the complete line of Sterling continuous duty and stand-by engines—gasoline, gas and diesel—supercharged and unsupercharged—from 75 to 1800 horsepower.

Every executive in the petroleum industry who is interested in the latest facts regarding power plants for operating drilling rigs, pipe line pumps, electrical generators and other oil country applications will want a copy. Write for yours.

THE NEW STERLING VIKING DIESEL EIGHT CYLINDER INDUSTRIAL ENGINE
SUPERCHARGED FROM 320 TO 650 HORSEPOWER UNSUPERCHARGED FROM 245 TO 440 HORSEPOWER
Some of its features are: The compactness of a gasoline engine of the same power rating... Crankcase and cylinder block cast in one piece making for greater rigidity of construction... Accessibility for servicing.

STERLING ENGINE COMPANY • 1273 Niagara Street, Buffalo 13, New York

New York City, 900 Chrysler Building • Washington, D. C., 806 Evans Building • Chicago, Illinois, 855 Board of Trade Building

DISTRIBUTORS IN PRINCIPAL CITIES

rain will require little attention. However, it is not always economically feasible to fully coat a line and a compromise in initial investment must be made. This is particularly the case where the utility life of a line is indeterminable or estimated to be short. It can be assumed that most operators will be confronted with maintenance problems sooner or later.

Corrosion is generally accepted as being electro-chemical in nature. As one step in protecting the line after installation, a program of regularly checking pipe to soil potential and line currents should be set up. This will result in locations recommended for inspection. The next step is to uncover the pipe, clean it, and make indicated repairs. Phillip's practice is as follows:

After pipe is uncovered, it is cleaned, using power-driven cleaner which employs a cutter head followed by a wire-brush head. The mechanical cleaner does the bulk of the cleaning so that only little additional hand work is necessary. Pitting hammers are used to remove scale from any pits found. The depths of the deepest pits in each 5-ft. section of pipe inspected are measured in order to determine the severity of the corrosion, to correlate findings in the field with those indicated by the corrosion survey, and to furnish necessary information to the maintenance superintendent for deciding how to recondition the pipe.

If the pits are casual and not too deep, they are spot-welded using ⅛-in. or 5/32-in. electric welding rod. If pits are too deep to permit safe spot-welding or too numerous to be economically spot welded, they are covered with preformed unbeveled half soles.

If the condition of the pipe is too bad to permit welding of the half soles safely, it is cased with preformed split casing beveled on all four sides. The casing is extended beyond the corroded area. After all metal work is completed, pipe half soles and casing are given a final cleaning. Coal-tar primer is then applied followed by two 1/16-in. coats of coal-tar or water-works enamel and a spiral-asbestos wrap. In locations where the line is continuously under water, a flood coat of coal-tar enamel is applied over the spiral-asbestos wrap for additional protection. After coating, a holiday detector is used to check the coating job. It should be mentioned that all of this reconditioning work is done with the line operating at usual pressure. Only rarely, when the pipe is particularly bad, is the normal operating pressure reduced while welding is in progress. The product flow, however, is continued.

One of the most important segments of the external-maintenance program is record keeping. In order intelligently to maintain a pipe line it is necessary to have correlation between the office and field and among the engineering, maintenance, and operating departments. To accomplish this we employ what is more or less a standard corrosion map, or rather a series of corrosion and maintenance log sheets. Each sheet is 24 by 36 in. in size and represents approximately 6 miles of pipe line. On it are recorded such data as topography and drainage, surface soil, subsoil, right-of-way notes, soil resistivity and line currents, engineering recommendations, and record of maintenance. Each sheet is suitable for 20 years of record. The maps are kept up to date by regular posting of corrosion engineer's recommendations and plotting of actual reconditioning. As reconditioning progresses in the field it is reported by the maintenance foremen on a form provided for the purpose. This form when properly filled out shows every detail of the maintenance performed including location, method of uncovering and cleaning, condition of coating, nature of soil, type of cultivation at the location, pit depth, and detail of all reconditioning work done. At least once

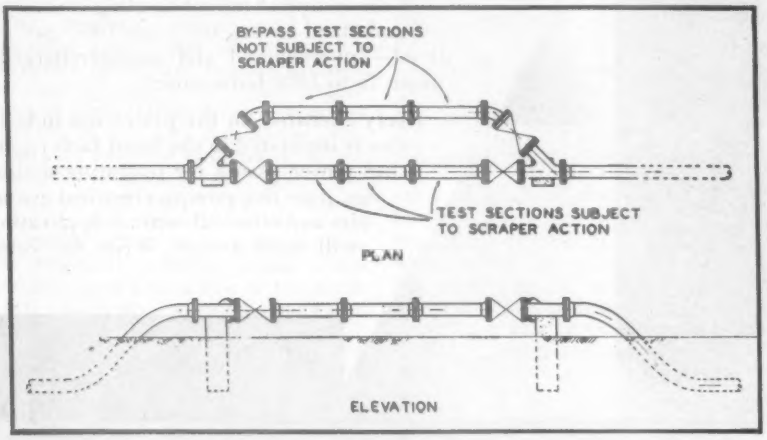


Fig. 1

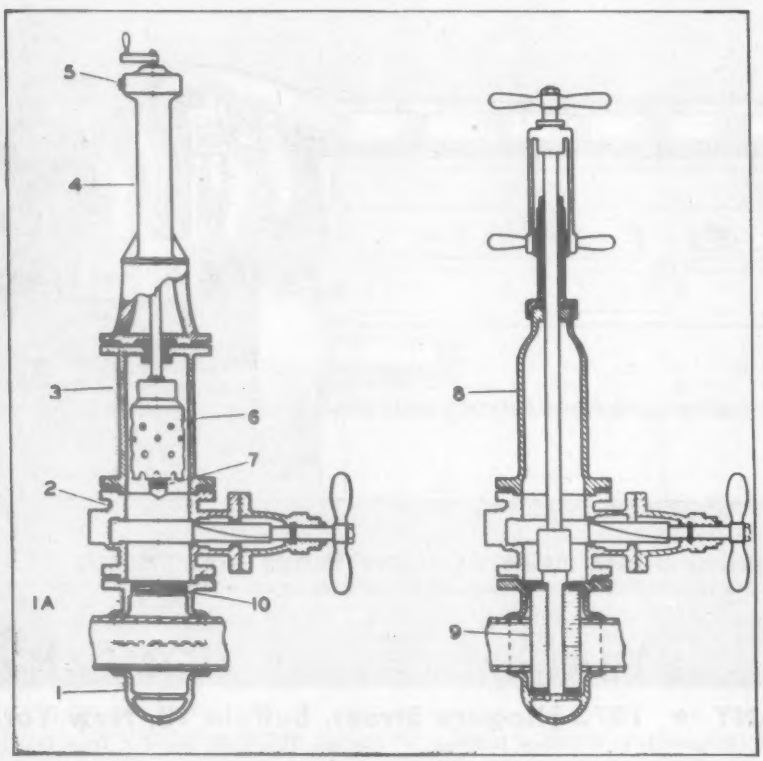


Fig. 2 *Fig. 3*

each year a recap is made from the corrosion maps showing:

Total points recommended for inspection.

Total points inspected.

Total footage reconditioning recommended.

Total footage reconditioned.

Obviously the reconditioning methods discussed above are expensive but we have found it effective in reducing leaks—and it can be accomplished without down time.

Preventive Maintenance—Internal

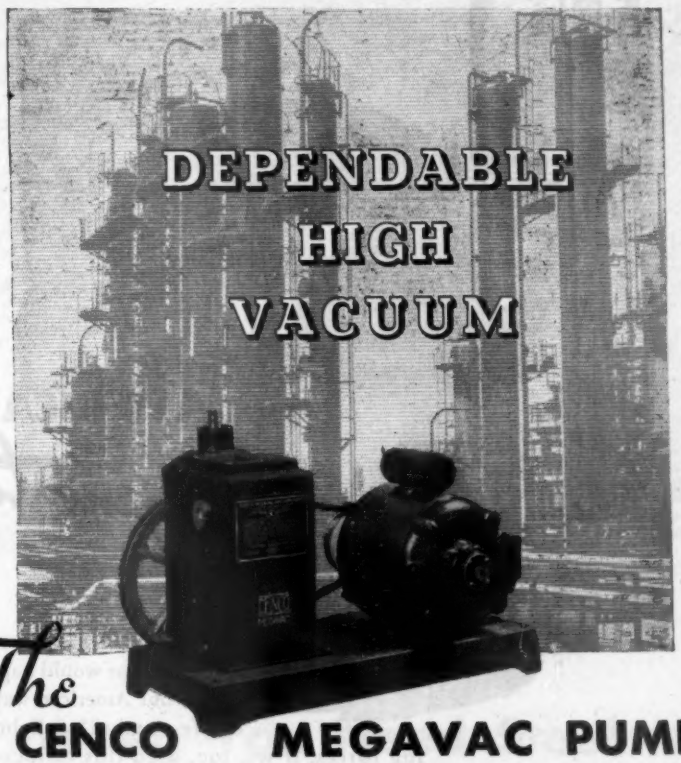
As mentioned previously, when product lines first came into use it was thought there would be no problems involving the internal condition of the pipe[3]. The products pumped would be clean, sweet, and noncorrosive—as in fact they generally were and are. Another combination, however, oxygen and moisture, also was present and after various periods of operation (depending upon conditions) it became apparent that internal corrosion was present as evidenced by an increasing quantity of line scale and lowering of the "C" factor[4]. From the experience of gas lines with internal corrosion all of this might have been anticipated, but apparently most products-line operators learned the hard way, and while such internal corrosion in most cases did not even approach calamity so far as loss of metal was concerned, the roughening of the interior seriously affected throughput. Also the scale was a source of pumping trouble and detrimental to the stability of the product.

Since the problem of internal corrosion was first recognized, a number of methods of combating it have been developed. One of the first steps was to eliminate so far as possible, the principal agents of corrosion, air and water, from the line. Actually it is almost impossible to keep out small quantities of water, and oxygen in some degree is always present. It has proved more practical to work toward eliminating the oxygen by injecting into the pumped stream such oxygen-absorbing chemicals as sodium sulfite, sodium chromate, sodium nitrite, and mercapto benzo thiozole.

As Phillips was one of the first major products-pipe-line systems our experience with internal corrosion began early and between 1934 and 1939 our research and operating departments devoted considerable attention to the use and effect of corrosion inhibitors[5]. It was necessary to have an inhibitor which would not only do the primary job of preventing corrosion but had no deleterious effect on the gasoline and which would be simple to handle and inject. After much laboratory and pilot-plant testing, mercapto benzo thiozol (Rokon) was decided upon and we began injecting it at the Borger, Tex., origin of our line in 1936. A second injection point was added at Laverne, Okla., station in 1938 and in the past 2 years the protection has been extended as far as St. Louis. Examination of test spools recently on our line between St. Louis and Chicago shows slight internal corrosion and some time this year we expect to install injection equipment and begin adding Rokon in this section.

Engineers are not agreed on the effect of scrapers on internal corrosion. Some contend that scraping is beneficial by "squeegeeing" out casual water. Others contend that scraping accelerates corrosion by constantly exposing fresh metal surface to attack. Regardless of this, however, all agree that if there is an internal condition whereby tubercles are being formed on the pipe, scrapers are useful or essential to remove them and reduce hydraulic friction. Also scrapers and sediment traps are highly useful in determining whether or not there is active corrosion in the line, although this, of course, is not their primary purpose.

In this connection, an experiment conducted on our system may be of interest. In January 1944 we discontinued scraping in the Borger-Wichita section except for a 42-mile



The **CENCO MEGAVAC PUMP**

Provides high vacuum for fractional distillations, for temperature and pressure measurements, for circulating nitrogen through packed columns, and for other procedures in the analysis of complex hydrocarbon mixtures.

The Cenco Megavac Unit combines high vacuum, high speed, and dependable operation. Speed, 375 ml per second at 1 micron. Vacuum, 0.1 micron or better. Proved for faithful, trouble-free service.

Catalog No. 92015A for 115-volts, 60 cy. . . . $155.

Technical personnel in the oil industry are invited to receive "Cenco News Chats" containing descriptions of latest scientific apparatus. Ask for "Cenco News Chats" No. 49.

CENTRAL SCIENTIFIC COMPANY

SCIENTIFIC INSTRUMENTS CENCO LABORATORY APPARATUS

NEW YORK TORONTO **CHICAGO** BOSTON SAN FRANCISCO

Pioneers in High Vacuum Pump Manufacture

subsection between Borger and Spearman. In this subsection we intensified the scraping, running 70 scrapers in 60 days. With all of this scraping a very small quantity of scale was collected in the trap at Spearman and the "C" factor did not improve. We concluded from this that the line was clean, that scraping was unnecessary and that the inhibitor we had been adding was fully effective. With the exception of an occasional scraper to remove water, scraping has been discontinued in this section now for over a year. The "C" factor has remained constant. In December of last year scraping was similarly discontinued in the section between Wichita and Paola—also with no loss in value of "C." After the inhibitor has had time to clean the Missouri and Illinois sections, we anticipate we can eliminate our scraping program there also.

One method of determining when internal corrosion is occurring has been mentioned, i.e., regular scraping and measurement of scale and rust collected in sediment traps. Installation and periodic inspection of corrosion bars or test coupons in contact with the pumped products is another method. It is the writer's opinion, however, that the only reliable method is inspection of the pipe itself. Rather than rely on adventitious samples taken in course of repair, piping changes, pipe replacement, etc., it is better to install removable test spools at selected points. We have seen pipe seriously internally corroded with the corrosion limited almost entirely to the bottom quadrant. On the other hand we have seen pipe, particularly from water lines, where the corrosion was confined to the top. It seems likely that a corrosion bar inserted in the top of the pipe might fail completely to reflect corrosion limited to the bottom of the pipe—and vice versa. Also corrosion bars are not otherwise subjected to the same conditions as the pipe since they must be installed in a bypass where they are not brushed by scrapers as is the pipe itself. One method of installing a removable test section is illustrated in Fig. 1. Such an installation could be used to test simultaneously a number of steels, alloys, interior coatings, and inhibitors.

Ruptured Pipe Lines

It has been our experience (and our contacts with other pipe-line operators indicate our experience is typical) that ruptured lines are very infrequent, at least in the sense of a sudden break. We have installed a number of automatic controls to prevent excess line pressure and to otherwise insure even flow at desired rate. Each input or product originating station has a rate-of-flow controller. This instrument will deliver at any rate for which it is set by controlling engine speed. All stations are equipped with line-pressure governors which hold either intake or discharge at the pressure for which they are set. Finally there is an overpressure shutdown on the discharge of each station, operated independently of the other automatic controls which will shut down the station by interrupting the engine fuel supply if the discharge pressure reaches the safe maximum.

There are the unusual cases of pipe line being inadvertently severed by road graders, washed out and broken by floods, and even deliberately dynamited—but these must be classified as accidents, calamities, or mischief. The common cause of loss of product from a pipe line is leakage caused by external corrosion.

Sometimes it is necessary to cut the line to remove a stuck scraper, to replace an unrepairable section, to install valves, insulating flanges, or for other reasons. The location where the pipe has to be cut may be in low profile, remote from block gates so the section cannot be pumped dry. The drainage may extend several miles and involve removing or displacing a large volume of product. It sometimes is undesirable or impossible to displace the

AMERICAN *Ingenuity*

Imagine what would happen to our American way of life—and to our fighting forces, if we, too, used this Chinese Coolie's mode of transporting oil.

Thanks to American ingenuity, petroleum and its many by-products are performing stupendous assignments on all battlefronts and in serving civilians at home.

Today it is the privilege of this bank to plan and to work closely with men in the petroleum industry. Our services are kept attuned to the changing pattern and expanding requirements of a greater petroleum industry in the Southwest.

First National Bank
IN DALLAS MEMBER FEDERAL DEPOSIT INSURANCE CORPORATION

product in the line with water. Tapping the line and hauling the line product to the nearest refinery or bulk station is time consuming and expensive. There is available a tapping machine with pressure control fittings the use of which eliminates the necessity of water displacement or extensive draining of the product. Developed originally for use on domestic gas service lines, it is now finding wide use on trunk pipe lines. This equipment is sketched in Figs. 2 and 3. Briefly the procedure in using it is as follows:

Forged-steel saddle-type fittings (1) (1A) are electric welded on the line in two halves, while the line is still operating if desired. Gate valve (2) is installed with cutter adapter (3) above. The feed mechanism (4) is mounted on top. The feed mechanism can be operated by hand or by an air motor attached to the feed mechanism at connection (5). The cutter (6), is the same diameter as the pipe line and cuts down through the upper and lower half of the pipe actually cutting the pipe away. The pilot drill (7) has threads above the point which permit the removal of the blanks after cutting.

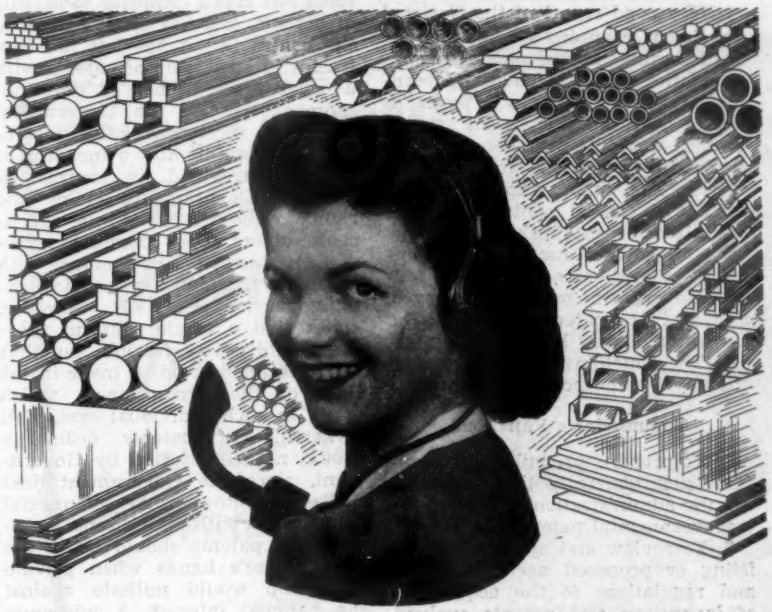
After the cutter and blanks are raised above the gate valve, it is closed and everything above the gate is removed. The plug adapter (8) with cylindrical synthetic plug (9) is placed over the gate valve, the gate valve opened and plug forced down to seal off the flow. The plug will seal off against 100 lb. or more of static pressure. If the location is in a valley it may be necessary to plug off at two points to permit working between.

After the repair work is complete the synthetic plug is raised above the gate, the gate closed, and a bronze flat plug inserted in its place. The gate is then opened and the bronze flat plug (not shown) is screwed into threads (10) in the neck of upper saddle fitting (1A). The gate valve and all parts above are then removed. The bronze flat plug is then made up tight by a special wrench after which a blind flange is bolted on the upper saddle fitting and the job is complete.

It seems entirely possible and probable that within a few years new pipe lines can be built with tubes of corrosion-proof plastic or of conventional steel so effectively coated inside and out that maintenance of the line itself will become a minor problem. In fact it is the writer's guess that plastic or plastic-coated pipe will be available some time before the pipe-line companies are ready to accept it. This is understandable. Conditions existing on a long trunk pipe line cannot very well be duplicated in the laboratory and the only sure test lies in the field and in time. Regardless of laboratory or pilot-installation indications, pipe-line operators will be slow to buy and bury miles of any new type line until they are sure they will not have to dig it up in a few years and start over. The very fact that a large part of the cost of building a pipe line is ditching and back-filling makes experimentation on a large scale impracticable. Past experience with protective coatings fully justifies the pipe-line operators being a bit "cagey" in the matter. When the new materials are offered it doubtless will require joint testing by all concerned and substantial proof of performance before there will be general acceptance by the pipe lines.

Bibliography

1. Petroleum Bibliography No. 17, Pages 14-40 inclusive. Tulsa Public Library.
2. Hugo, L. A., Phillips Petroleum Co.—Experience in Use of Pearson Electronic Coating Inspector.
3. Sullivan, D. E.—"Experiences With and the Effect of the Use of Scraper on Internal Corrosion of Gasoline Pipe Lines," 22nd Annual Meeting A.P.I.—San Francisco 1941.
4. Pearson, J. M., "The Amount and the Measurement of Internal Corrosion in Gasoline Pipe Lines," 22nd Annual Meeting A.P.I., San Francisco 1941.
5. Morris, L. C., and Schulze, W. A.—"Internal Corrosion of Gasoline Pipe Lines," Proc. A.P.I. 20 (IV) 14 (1939).



Call Ryerson When You Need Steel

Every type of steel from stainless to structurals is immediately available from Ryerson stock. Just reach for the phone and call any one of the eleven conveniently-located Ryerson service plants. Our operators will connect you at once with an experienced service man who will see that you get the steel you need—when you need it.

JOSEPH T. RYERSON & SON, INC. Steel-Service Plants: Chicago, Milwaukee, Detroit, St. Louis, Cincinnati, Cleveland, Pittsburgh, Philadelphia, Buffalo, New York, Boston.

QUICK, DEPENDABLE SHIPMENT

Front Lines in

REFINING

by Arch L. Foster

Patent Planners Urge Central Control Body

THE second report of the National Patent Planning Commission issued recently makes several recommendations to the federal Government regarding changes in the manner of operating our patent system, in most ways the most complete and successful patent system in the world. The main recommendation is that a central control body be organized or established, to carry out the several functions of handling patents belonging to the federal Government or to its employes, and of those patents in which the Government may have a part interest. The functions referred to specifically by the commission are:

Commission's Functions

1. To prepare, promulgate and enforce such general policies concerning the administration of federal intragovernmental patent matters.

2. To review and approve all existing or proposed agency policies and regulations to the acquisition of inventions and patents evolved by governmental employes.

3. To serve as an appellate tribunal with final powers of decision as regards any disputes which may arise between employe-inventors and their respective agencies.

4. To approve such individual cash awards exceeding a specified amount which agencies may propose to give to their inventor-employes.

5. To review and give approval to any action which any agency may propose to take with respect to patents owned by the Government.

6. To serve the agencies as an educational, advisory and consultative medium, and as a clearinghouse for the interchange of information and plans, etc.

This report is built around the unsolved problem of the disposal, ownership, and utilization of patents owned by the Government and its employes. Four different methods have been employed heretofore to handle patents in which the Government has rights. The Government has retained blanket power to decide the disposition of all patentable developments made under the Government's contracts. The Government has taken complete ownership of patents, and has given license to the contractor; it has left the contractor in ownership of patents with a royalty-free license to the Government. Lastly, the Government not only receives royalty-free license to patents the ownership of which is retained by contractors, but the Government retains the right to require the owner to license others. The commission recommends a definite policy with regard to the methods used in handling such patents. It, however, states that a single uniform practice would not be feasible, but that each decision should be made in the light of the circumstances which apply in each individual case. Full ownership of patents ordinarily should not be asserted by Government, since the Government does not enter into normal commercial competition with its citizens. Ownership of patents should be in the Government's hands when private ownership would militate against the national interest. A minimum of a royalty-free license should be given the Government under all such patents.

This central control agency should be entirely outside existing governmental agencies whose activities may result in inventions, the commission believes, and should be composed of men of outstanding ability. The commission recommends that it, the patent central control body, should be placed in the executive office of the president, "preferably within the bureau of the budget and under the supervision of the director."

The Price of Too Much Purity

IN looking at the potentially enormous prospects for petroleum as a raw material source for a postwar organic chemical industry, we must pause and look carefully at costs. Petroleum offers so many hydrocarbons as starting materials for syntheses that an entirely new organic chemical industry seems in the making.

Cost of Basin Material

Much of the cost of any product can be in the cost of its basic material. Into that picture immediately comes the required purity of basic material for any given purpose. Making specifications needlessly stringent often adds tremendously to the unit cost of materials. In that line J. H. (Jim) Boyd in a recent issue of Chemical and Engineering News points out "Techniques for their (petroleum hydrocarbons) separation are already in commercial use but their development is far from complete. Insistence on high purity increases the cost of the hydrocarbon and this policy is greater the higher the average molecular weight, owing to the greater complexity of the mixture . . ." Seventeen hydrocarbons are being isolated and sold commercially in relatively large quantities; all but three are made in high purity which means high price. In many instances a lower purity will serve admirably for a given purpose; for example, assume a synthesis in which the manufacturer wishes to add a propyl group, C_3H_7, by means of the olefin propylene, C_3H_6; in this material the main inmpurity will be propane, C_3H_8, in all probability not at all reactive in the synthesis assumed. Pure propylene was priced early in the war (99+ per cent pure), at $3.50 per gallon in 5-gal. lots. Technical propylene (95 per cent) is priced at the same time at $2.00 per gallon, or only 57 per cent of the price of the pure product. With a difference of $1.50 per gallon in the price of the raw material, the difference in the market price of the synthesized product may easily make the difference between success and complete failure in competition. This price differential between technical and research grades of hydrocarbons increases as the molecular weight increases. In many cases ethylene and other products may be used very successfully at 50-60 per cent purity ranges at a small fraction of the cost of the 99+ per cent product.

The technological division of the refining industry is not at all relieved of responsibility for developing better purification methods for these and other possible products. Most of those now isolated are purified by fractional distillation. Accomplishments to date in that field are remarkable; azeotropic distillation aids in numerous instances such as in purification of toluene which for explosives synthesis must be very pure. This field is hardly touched as a general refinery tool for making pure products and great things must be in store for it.

Secondary Recovery in Nowata-Claggett Field

A SERIES of informal reports detailing results of intensive studies of so-called depleted oil fields to determine the practicability of the application of secondary-recovery methods, primarily for the purpose of overcoming the effect of the declining rate of discoveries of new fields, are being published by the U. S. Geological Survey. These reports are designed to stimulate interest in the secondary-recovery possibilities of stripper oil fields and to assist the petroleum industry in selecting productive areas that are favorable for secondary-recovery exploitation.

The second of the series, dealing with the results of various secondary-recovery efforts in the Nowata-Claggett field, Nowata County, Oklahoma, has been issued.

The successful application of secondary-recovery methods to stimulate oil production is not only one of the most promising for relief of an acute shortage of oil, but it is also an important conservation practice that prolongs the productive life of oil-producing properties. Any secondary-recovery project must be preceded by a petroleum-engineering study in order that the oil producer will have some conception of the quantity of oil he can expect to recover, the cost of such recovery, and the rate at which it can be recovered.

The report consists of a detailed investigation and study of the possibilities of applying secondary-recovery methods of operation, such as air, gas, or water, to the Bartlesville sand of the Nowata-Claggett field. It reviews the development and production history of the Nowata-Claggett field, and, by interpretation of relative oil recovery and sand-body characteristics, cites areas that appear to be expedient for secondary-recovery exploitation. Although portions of the field have been developed previously by a particular type of secondary recovery, the engineering techniques adopted are discussed in addition to the operational history of the project.

Copies of the report may be had upon request to the Oil and Gas Supervisor, U. S. Geological Survey, Tulsa.

Cecil Lanier has been appointed chief of Magnolia Petroleum Co.'s Oklahoma land department, Oklahoma City, succeeding **Louis Campbell.** Lanier was formerly land man in the Illinois, Indiana, Kentucky area. Campbell is retiring July 1 after serving Magnolia for more than 40 years.

BOOKS

THE BOGEY OF ECONOMIC MATURITY. By George Terborgh. Published by Machinery and Allied Products Institute, Washington, D. C. 261 pp. $3.

William J. Kelly, president of the Machinery and Allied Products Institute, describes this volume as the most complete analysis of the theory of economic maturity ever made, rejecting both the theory and the pessimistic forecasts to which it has given rise.

The theory of economic maturity, developed largely by Dr. Alvin H. Hansen of Harvard University, was eagerly cultivated by the New Deal as a justification for continuous deficit financing. It is still tremendously influential both in academic and government circles, Kelly noted, and is now being used to support the idea that we must have a continuation of deficit spending to assure satisfactory employment and production after the present war.

The advocates of economic maturity contend that the economy is being poisoned by chronic oversaving, reflecting inadequate opportunity for private investment. The shortage of investment outlets is said to be brought on by four historical developments: the decline of population growth, the passing of the frontier, the dearth of great new industries, and the increasing importance of depreciation reserves. These developments, characterized by the Institute's study as "the four horsemen of the new apocalyse," are analyzed at length and dismissed as substantially harmless.

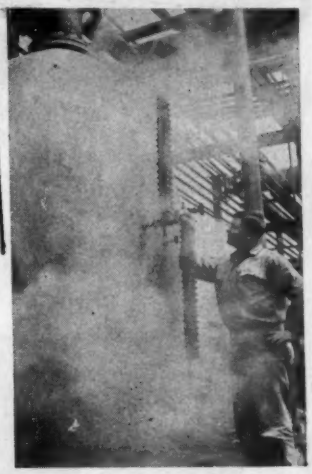
The study shows our real problem is not the combating of chronic stagnation but rather the damping down of the cyclical swings that have always characterized the economy.

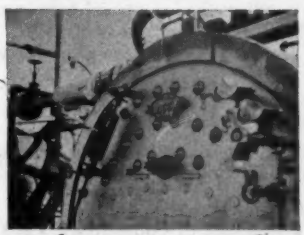
INDOORS • OUTDOORS

The Gage with

MAXIMUM VISIBILITY

is the Best Watch Dog





JERGUSON

THE purpose of a liquid level gauge is to reassure . . . or to warn, to warn through the eye. That's why it's vitally important that the gage give maximum visibility.

Without question, the JERGUSON Reflex Gage provides such visibility. The liquid in the column—any liquid—shows a dead black; the space above shows contrasting white. No better visibility can be obtained. If, however, the condition or color of liquid must be noted, we recommend our Transparent Gage, which is fitted with "see-through" glass.

Both gages are constructed of durable steel and alloy steel parts. The glass, carefully tempered, is resistant to high temperatures. And in both, the glass is installed in separate, strong strips rather than in tubular form.

JERGUSON GAGE & VALVE CO.

85 Fellsway Somerville 45, Mass.

6-IV-2

Rising Star

The habit of constantly TRYING leads to the habit of SUCCEEDING, as every parent—and every businessman—knows. It is this "habit of trying" . . . and succeeding . . . on the part of Hewitt's rubber engineers that has led to so many advancements in rubber for industry . . . that led to Hewitt's successful development of SYNTHETIC compounds 14 years ago . . . at a time when they were just a "gleam in the eye" of most manufacturers now producing them.

This priceless "plus" of constantly trying . . . of usually succeeding . . . means industrial rubber products designed to DO your job BETTER . . . do it LONGER . . . COST LESS per working hour.

★ ★ ★

Specify "Hewitt" for quality industrial rubber products. Phone the Hewitt distributor listed in the Classified Section of your telephone directory . . . or write Hewitt Rubber Corporation, 240 Kensington Avenue, Buffalo 5, New York.

HEWITT RUBBER *of Buffalo*

Job-Engineered Industrial Hose • Belts • Molded Goods

QUALITY RUBBER PRODUCTS FOR INDUSTRY FOR 85 YEARS

The Refiner's Notebook

A WEEKLY FEATURE OF THE OIL AND GAS JOURNAL

Tower Temperatures

IN making a heat balance of a fractionating tower (The Refiner's Notebook No. 45, June 2, 1945) the temperatures at which products are withdrawn from the tower are of vital importance. These temperatures are dependent on the composition of the material being withdrawn and upon the pressure in the tower. Materials that are removed as vapors (top product) usually issue from the tower at their dew points (temperature at which, upon cooling the vapor, a mist of liquid begins to form) but they can be removed at higher temperatures as in a natural-gasoline stripping still. For a mixture, the dew point is the 100 per cent point on its flash-vaporization curve. (Notebook No. 34, March 17, 1945). Materials that are removed as liquids (side products from the tower) issue from the tower at their bubble points (temperature at which upon heating the liquid a bubble begins to form). For a mixture the bubble point is the zero per cent point on its flash vaporization curve. These temperatures are shown in Fig. 1 for the crude oil of Notebook No. 31 of February 24, 1945. The bottom temperature is theoretically the same as a side-draw temperature provided the bottom of the tower is heated (a reboiler or still) but since the bottom is seldom heated, the bottom temperature is lower than the bubble point, being reduced by the heat extracted by steam stripping and by heat losses through the walls of the bottom of the tower. The temperatures in steam strippers and for the bottom of a tower will be discussed in Notebook No. 51. In most topping-plant towers the plate temperatures must be corrected for the partial-pressures effect (Notebook No. 39, April 21, 1945) of steam and other inert gases that pass through the tower. The temperature of the feed plate or vaporizer has already been discussed in Notebook No. 39 (April 21, 1945).

Top Temperature

Approximate top temperatures for atmospheric pressure and topping towers are given in Fig. 2. These were computed as in the example below but to cover all customary ranges of tower pressure, type of product, amount of steam, and amount of reflux. The 100-per-cent point on the flash curve was corrected for pressure and for the partial-pressure effect of steam. The high extreme of top temperature is for:

1. High tower pressure (15 psig.)
2. Minimum steam or gas.
3. Wide-boiling-range products.

And of course the low top temperatures are for the opposite tower conditions. Verification of the plate temperatures of Fig. 2. by actual plant data is given on page 467 of the 2nd. Ed. of Petroleum Refinery Engineering, McGraw-Hill Book Co.

Example A.—The flash-vaporization curve of the gas and aviation gasoline (Fig. 2) was computed by the use of Notebook No. 37 (April 7, 1945). Gas and aviation gasoline are handled as one product because they pass from the top of the tower as a single product. The 70 per cent temperature is at 9.1 per cent on the crude oil, or 224° F. and the 10 per cent point is at 1.1 per cent on crude oil or 80° F. The difference in the 70 and 10 per cent temperatures is:

$$224 - 80 = 144° \text{ F.}$$

Fig. 1—Flash-vaporization curves of the products evaluated in Notebook No. 31. Circle points indicate uncorrected plate temperatures

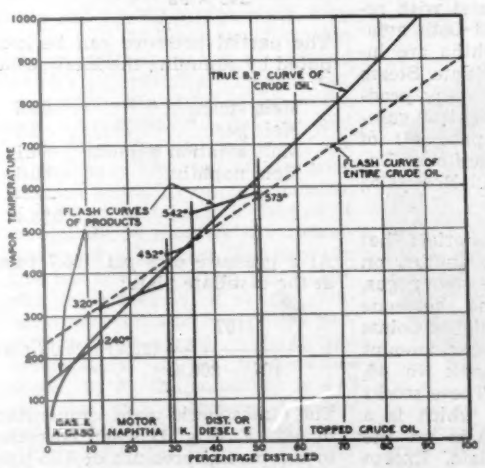
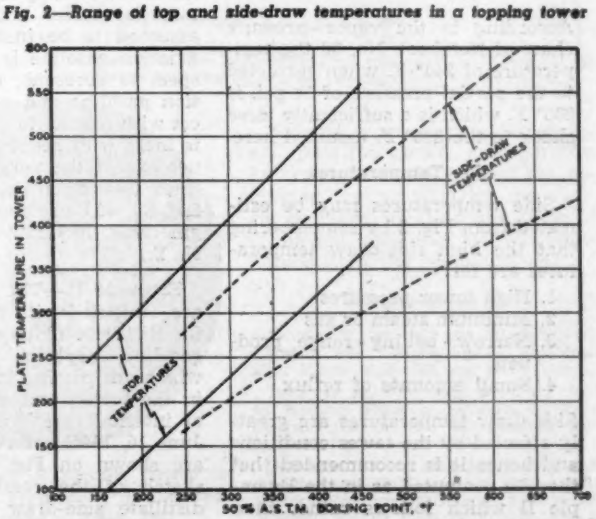


Fig. 2—Range of top and side-draw temperatures in a topping tower



No. 48 in a series by W. L. Nelson, professor of petroleum refinery engineering, University of Tulsa

The Refiner's Notebook (Continued)

The slope of the flash curve, according to Notebook No. 37, is 0.94. The 50 per cent temperature (6.5 per cent on crude oil) is 191° F., and hence the 50 per cent point on the flash curve is 4° higher or 193° F. The 100 per cent point on the flash curve is:

$$193 + 50 \times 0.94 = 240° \text{ F.}$$

This temperature (240° F.) must be corrected for the effect of steam. The quantities of the stocks and steam are given in Notebook No. 45 (June 2, 1945) entitled "Tower Heat Balances." Assume a top temperature of 240° F. and check later.

It happens that the reflux heat for this situation has already been computed in Notebook No. 45 as 5,286,000 B.t.u. per hour and hence the amount of reflux can be computed by dividing the 5,286,000 by the latent heat of the gasoline (124, see Notebook No. 43) and the molecular weight (94, see Notebook No. 47, June 23, 1945).

$$\frac{5{,}286{,}000}{124 \times 94} = 453 \text{ mols/hr.}$$

$$\text{Steam} = \frac{2182}{18} = 121 \text{ mols/hr.}$$

Total mols 574

For a top pressure of 3 psi. or 17.7 psia.—

$$p = \frac{453}{574} \times 17.7 = 14 \text{ psia.}$$

According to the vapor-pressure chart of Notebook No. 38 the temperature of 240° F. when corrected to the partial pressure of 14 psi. is 238° F. which is a sufficiently close check to the 240° F. assumed here.

Side Temperatures

Side temperatures may be estimated from Fig. 2 by remembering that the high side-draw temperatures are for:

1. High tower pressures
2. Minimum steam or gas
3. Narrow-boiling-range products
4. Small amounts of reflux

Side-draw temperatures are greatly affected by the tower conditions and hence it is recommended that they be computed as in the Example B which follows rather than read from Fig. 2. The zero per cent points on the flash curve of the

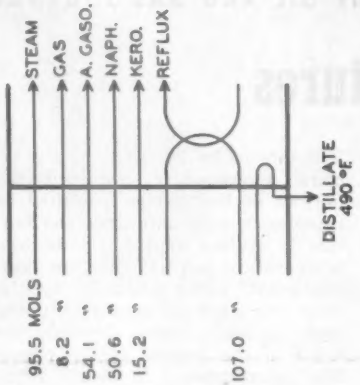


Fig. 3—Materials entering and leaving the distillate side-draw plate of Example B

product (see Fig. 1) must be corrected for the presence of steam and for the inert vapor that passes the plate. Materials that boil at much lower temperatures than the material under consideration are assumed to be inert gases. Thus, aviation gasoline is inert with respect to kerosene; and both aviation gasoline and naphtha are inert with respect to distillate. Steam is inert with respect to any product except the very lightest gasolines (see discussion page 471 of 2nd Ed. of Petroleum Refinery Engineering, McGraw-Hill Book Co., N. Y.)

Example B.—The materials that are contacted with one another on the distillate plate are steam, gas, gasoline, naphtha, and kerosene which are passing to higher points in the tower, and a large amount of internal (see Notebook No. 46, June 16, 1945) reflux. These stocks are shown on Fig. 3 which is a sketch of the conditions on the distillate side-draw plate. Except for reflux, these quantities can be computed by dividing the pounds (Notebook No. 45) by the molecular weight (Notebook No. 47):

$$\text{Mols steam} \ldots\ldots \frac{1720}{18} = 95.5$$

$$\text{Mols gas} \ldots\ldots \frac{245}{30} = 8.2$$

$$\text{Mols aviation gasoline} \frac{4980}{92} = 54.1$$

$$\text{Mols naphtha} \ldots\ldots \frac{7230}{143} = 50.6$$

$$\text{Mols kerosene} \ldots\ldots \frac{2820}{185} = 15.2$$

$$\text{Mols distillate} \ldots\ldots \frac{7800}{245} = 31.8$$

By assuming the distillate-plate temperature (say 490° F.), a heat balance can be used to determine the amount of internal reflux at the plate:

		B.t.u./hr.
Cool gas and gasoline	5225(581-490)0.62 =	294,000
Cool naphtha	7230(581-490)0.6 =	396,000
Cool kerosene	2820(581-490)0.6 =	154,000
Cool distillate	7800(581-490)0.59 =	418,000
Cool topping crude	25725(581-554)0.72 =	501,000
Condense distillate	7800 × 92 =	717,000
		2,480,000
Heat steam	1700(490-400)0.5 =	76,000
Reflux heat at distillate plate		2,404,000

The internal reflux and distillate is:

$$\frac{2{,}404{,}000}{245 \times 92} = 107 \text{ mols}$$

The partial pressure can be computed by summing the inert gas as:

Mols steam	95.5
Mols gas	8.2
Mols aviation gasoline	54.1
Mols naphtha	50.6
	208.4

At a pressure of 9 psi. (23.7 psia.) at the distillate plate:

$$p = \frac{107}{107 + 208.4}(23.7) = 8.05 \text{ psia.}$$

The atmospheric plate temperature of 542° F. (Fig. 1) when corrected to the partial pressure of 8.05 psia. is 493° F. This is a reasonable check to the 490° F. assumed above.

Testing Wells Clogged With Paraffin

Characteristics of paraffin.—One of the commonest substances which accumulates in old wells in fields having paraffin oils is paraffin wax. Paraffin accumulates in flow tanks, flow lines, in tubing, and on the pay faces of old wells having low liquid levels. In some places it even forms in the pores of the oil formation itself. Its presence as a precipitate in oil makes the oil more viscous; in the pay it renders the formation less permeable, and once in the well, it tends to clog tubing and flow lines.

Paraffin consists of very small, needle-shaped and feathery crystals, visible only under a high power microscope (Fig. 1), which tend to agglomerate and form granular-like particles of solid, impure wax. Deposits cleaned out of wells contain largely wax, but with the wax are some gums, resins, asphaltic materials, crude oil, sand, and silt held together by the paraffin matrix. The deposit varies from a mushy liquid to a hard solid, depending upon how much oil is included in the mass. Commonly the mass slowly loses oil, and the older a paraffin deposit is, the harder it becomes. Table 1 shows the melting points and composition of paraffin from seven typical oil sands analyzed by the U. S. Bureau of Mines.

Causes of paraffin precipitation.—Three factors combining to bring about the formation of paraffin in wells and tubing are: (1) Loss of gas and light volatile constituents from the oil; (2) temperature drop in the oil; (3) presence of certain foreign matter in the oil around which the paraffin crystals can precipitate. The first cause is the most important. As the gas and lighter constituents come out of the oil due to a lowering of the pressure, the solubility of oil to paraffin is reduced and paraffin begins to precipitate as soon as the saturation point is reached. Temperature also has quite an effect. For example, Salt Creek oil is nearly saturated and contains 5 per cent paraffin wax at normal underground temperature. If the temperature drops 70° F., the solubility is 4.82 per cent and, therefore, 0.18 per cent precipitates out of solution. According to the Bureau of Mines' this 0.18 per cent in a 30-bbl.-a-day well amounts to 1.6 gal. of paraffin per day, assuming that only one-half of the wax is deposited. Wells that make much water usually have less paraffin trouble because water has about twice the specific heat as oil and, therefore, is hot enough to prevent the liquid cooling until it reaches the surface. Water also tends to keep liquid levels higher in wells and, therefore, tends to prevent precipitation on the sand surface. Experience has shown that most precipitation occurs at the point in the tubing or well which is alternately wet and then emptied of oil by the pumping operation.

Method of preventing paraffin accumulation in wells.—Procedures which tend to prevent the formation of paraffin are: (1) Keeping liquid levels of oil in wells high so that the surface of the sand will be covered with oil at all times. (2) Producing the oil with a minimum amount of gas and keeping the production of fluid as steady as possible. The use of a gas anchor below the working barrel to prevent gas from separating from the oil has proven successful in preventing paraffin troubles. (3) Use of fluid-level indicators or use of an intake or fluid-level regulator placed in such a position so that the fluid level in the well cannot be lowered below the top of the sand. (4) Frequent elimination of excess paraffin from the bottom of the hole. In many wells paraffin accumulates in the tubing and is cleaned out by removing the rods and pump and by running in a paraffin hook. Pieces and slices of paraffin fall back into the bottom of the hole every time the rods are pulled out and the tubing cleaned.

Methods of removing paraffin from the well.—A number of paraffin solvents are in use for dissolving paraffin in a well; namely, casinghead gasoline, pentane, light gas oil, and a number of special commercial compounds. These chemicals are added through a lubricator or are poured directly into the well if it is not making much gas. The well is then shut down for about 12 hours, then opened and all fluid flushed or pumped out. In some wells where paraffin is especially bad, some of the chemical solvent may be lubricated in daily to dissolve the paraffin as fast as it forms. In other places the treatments are repeated two or three times using from 1,000 to 2,000 gal. of the solvent.

TABLE 1—COMPOSITION AND MELTING POINTS OF PARAFFIN IN OIL WELLS

Field and formation—	Per cent oil content	Per cent silt, sand and water	Melting point, (°F.)
Salt Creek, Wyo., Wall Creek	35.1	2	165.4
Lance Creek, Wyo., Dakota	24.0	4	151.0
Marietta, Ohio, Macksburg	30.0	6	135.2
Bradford, Penn., Big Indian	32.0	2	161.2
Church and Field, Tex., Permian limestone	38.0	3	164.6
Panhandle*, Tex., Granite wash	25.0	7	141.2

*Another analysis of wax from the Panhandle field showed 25 per cent oil, 58 per cent wax, 16 per cent gums and resins, and 0.5 per cent asphaltic material.

Fig. 1—Crystals of paraffin formed in crude oil by evaporation and cooling. (After U. S. Bureau of Mines, X50)

Several types of paraffin scrapers, paraffin hooks, and paraffin knives have been devised for removing the paraffin by mechanical methods. Heat in the form of steam has also been tried in Panhandle fields for removing wax.

References

Reistle, C. E., Jr., and Blade, O. C. Paraffin and Congealing-Oil Problems: Bur. Mines, Bull. 348, pp. 1-171, 1932.

Ihrig, H. K., Petroleum Solvents Used to Remove Paraffin Deposits in Flow Strings: The Oil and Gas Journal, Vol. 34, p. 37, December 5, 1935.

Albright, J. C., Cleaning Out Paraffin—Solvents Successful in Overcoming Serious Problem at Oklahoma City: Oil Weekly, Vol. 80, p. 24-26, Feb. 3, 1936.

Series prepared by F. B. Plummer, professor, petroleum engineering school, University of Texas

Natural Gas

Warren to Supply Gas for Johnson's Carbon Black

OKLAHOMA CITY. — The Oklahoma Corporation Commission has authorized Charles Eneu Johnson & Co. to buy residue gas from Warren Petroleum Corp.'s natural - gasoline plant near Madill for use in manufacturing carbon black at the Johnson plant near Stonewall. The price for the gas is not to be less than 5 cents per 1,000 cu. ft. A pipe line from the Warren plant, to be built by Defense Plant Corp., is expected to move 8,000,000 cu. ft. of gas daily.

Institute of Gas Technology Publishes "Gas Abstracts"

CHICAGO.—The first issue of "Gas Abstracts" has been published by Institute of Gas Technology here. This journal will serve the natural and manufactured gas industries as an abstract service for technical articles and publications on gas and its technology. The purpose of the Abstracts is to assemble especially for the use of the institute's staff and technical personnel those articles which are of greatest interest to the gas industry, making it unnecessary for each staff member to survey the entire field of related literature. More than 100 journals and publications will be abstracted and the publication will be available in the institute's library. A scale of prices for the Abstracts will be published soon. Requests for copies should be addressed to the Library, Institute of Gas Technology, 3300 Federal Street, Chicago.

FPC to Hear Argument in United Case September 12

WASHINGTON. — Federal Power Commission will hear oral argument September 12 on the legality of proposed rate increases for natural gas sold by United Fuel Gas Co., Warfield Natural Gas Co., Cincinnati Gas Transportation Co., and Huntington Development & Gas Co. to each other, to other subsidiaries of the Columbia Gas & Electric Corp., and to nonaffiliated companies. All four of the companies involved are Columbia subsidiaries and have their principal offices in Charleston, W. Va.

The commission explained that the hearing was desirable "in the light of the recent decisions of the Supreme Court of the United States in Colorado Interstate Gas Co. vs. Federal Power Commission, Canadian River Gas Co. vs. Federal Power Commission, Colorado-Wyoming Gas Co. vs. Federal Power Commission et al, and Panhandle Eastern Pipe Line Co. et al vs. Federal Power Commission, et al."

The oral argument was requested by the four respondent companies, the State of West Virginia, Board of Public Works of West Virginia, Public Service Commission of West Virginia, and limited participants, Wesley H. O'Dell et al, producers or owners of gas in place.

"The argument in the 'United' case," said Chairman Basil Manly, "will present the first opportunity the commission has had to hear the contentions of counsel for the various interested parties with respect to the recent decisions of the Supreme Court."

Soaring Postwar Demand For Carbon Black Seen

Soaring postwar demand for carbon black is expected in view of unprecedented expansion in rubber-tire manufacture, United Carbon Co., Inc., says in a survey recently released. The rubber industry now accounts for 90 per cent of the domestic consumption of carbon black, which is considered the best reinforcing pigment known. Thirty-seven additional projects for production of channel and furnace blacks have been launched since March 1944.

Total carbon black production for 1945 is estimated at 1,240,000,000 lb. This compares with 991,000,000 in 1944 and 477,000,000 in 1938.

Use of synthetic rubber calls for higher percentages of carbon black than was the case with crude rubber. Thus, a 4-ply 6.00x16 casing now requires 5 lb. of carbon black, almost a fourth of the total weight of the tire, as against 3½ lb. for a natural-rubber casing. Estimates of how much more is needed, compared with natural rubber, range from 30 to 100 per cent.

Rubber authorities estimate that 77,500,000 new tires for the United States alone will be needed in the first 12 months after automobile manufacture gets under way. This compares with 61,540,000 tires built in the peak year of 1941.

In the middle of 1944, the annual rate of production of furnace black was approxmately 430,000,000 lb. By the end of the year, the operation of additional furnace plants brought the annual production up to 539,000,000 lb.

Natural Gasoline

Revised Table of Physical Constants Now Available

A revision of "Standard Table of Physical Constants for the Paraffin Hydrocarbons" has been issued by Natural Gasoline Association of America, according to announcement by W. F. Lowe, secretary-treasurer. This table, adopted first in 1942 and revised this year, now represents the combined efforts of the technical committees of N.G.A.A. and California Natural Gasoline Association. It is a joint standard of the two associations, and will be kept up-to-date as better values are determined.

It is understood that the American Petroleum Institute committee on measuring, sampling and testing natural gasoline is considering adoption as standard the values as presented in the table. The data are also to be submitted to the American Society for Testing Materials. It is hoped that a national standard for the constants for these hydrocarbons may be developed.

April Output of Natural Gasoline Rises Slightly

WASHINGTON.—The daily average output of natural gasoline and allied products rose slightly in April, according to the Bureau of Mines. Increases were reported in some districts of Texas and in California. Declines occurred in the Louisiana Gulf area and Appalachian states. Stocks at plants, refineries and terminals rose 5,818,000 gal. during the month. Refinery demand for natural gasoline and liquefied gases, except isopentane, fell with the advent of warmer weather.

PRODUCTION
(Thousands of gallons)

	April	March
Natural gasoline	177,082	178,682
Natural gasoline mixture	29,736	30,119
Raw condensate	35,661	38,519
Liquefied petroleum gases:		
Commercial butane-propane mixture	21,971	24,324
Normal butane	38,125	41,652
Propane	23,950	23,015
Other mixtures (L.P.G.)	13,829	13,264
Iso-butane	13,669	14,781
Iso-pentane	12,863	12,911
Finished gasoline and naphtha	18,870	19,265
Other products	3,076	3,432
Total	388,832	399,964

GARDNER-DENVER

14x14 Twin Cylinder, Roller-Bearing STEAM DRILLING ENGINES

★ FOR THE DEEPEST HOLES AND THE HARDEST FORMATIONS ★

The 14 x 14 "Heavy Duty" Piston Valve type Steam Drilling Engine that is intended for the deepest holes and the hardest formations.

- The valve, or "Woolf," gear is characterized by its extreme simplicity of design, construction, adjustment and operation.
- For better lubrication, there is an extra feed directly into each steam cylinder near the top of the bore, as well as the three conventional feeds.

Write, or ask your Continental representative, for Bulletin DE-120 containing full details.

THE CONTINENTAL SUPPLY COMPANY
General Offices: DALLAS, TEXAS
EXPORT DIVISION
30 Rockefeller Plaza New York City, N. Y.
Representatives
MEXICO - ARGENTINA - ENGLAND - TRINIDAD BRAZIL

CONTINENTAL

Serving the Oil and Gas Industries

The "HOW TO BOOK" about tube cleaning
YOURS FOR THE ASKING—

How to make tube cleaners last longer— work faster— clean better—

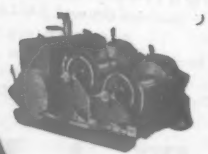
An authoritative article by L. A. Kunder, tube cleaner specialist, reprinted from PETROLEUM REFINER and distributed by ELLIOTT COMPANY, Springfield, O

ELLIOTT Company
Tube Cleaner Dept.
SPRINGFIELD, OHIO
District Offices in Principal Cities
Y-239

LEADING CONTRACTORS PREFER
Sterling
PUMPS · HOISTS · LIGHT PLANTS

DEPENDABLE
RUGGED
SIMPLE
•
SAVE MONEY
SAVE TIME

EASY TO OPERATE
•
WRITE FOR CATALOG



STERLING
MACHINERY CORPORATION
405-13 SOUTHWEST BLVD. KANSAS CITY 10, MO

REFINING

Humble Plant at Ingleside Taken Over by PAW

CORPUS CHRISTI.—Operation of Humble Oil & Refining Co.'s refinery at Ingleside was taken over by Petroleum Administration for War June 22. The seizure was ordered by President Truman June 6, but a series of legal actions caused delay. Production was not interrupted.

Bob Shirk, an official of PAW's district office at Houston, and Dudley Cornell, PAW district counsel from Houston, carried out the order.

"There is no reason to expect anything other than a satisfactory continuance of vital war production, which is uppermost in the minds of all concerned in carrying out the president's order," Shirk said.

The seizure was recommended to the president by William H. Davis, director of economic stabilization, who said it grew out of the company's refusal to carry out a War Labor Board directive.

Shirk and Cornell termed it a "repossession" since signs had been posted taking over the plant June 6, the same day the action was stopped by a temporary order from Federal District Judge T. M. Kennerly against the seizure.

Judge Kennerly, after a hearing, denied Humble's application for a permanent injunction, and set expiration of the temporary order at noon June 22.

Earlier that day in Houston Federal District Judge J. C. Hutcheson had denied a plea by Humble for a preliminary injunction to further restrain PAW from taking over the plant, pending an appeal.

General Petroleum Corp. Promotes Five Key Men

LOS ANGELES.—Five promotions in General Petroleum Corp. have been announced by R. C. Wheeler, vice president and manager of the manufacturing department.

P. S. Magruder, who was manager of the gas department, has been appointed assistant manager of manufacturing.

H. L. Eggleston, formerly with Gilmore Oil Co., has been named manager of the gas department and will continue to manage the manufacturing activities of the Gilmore Road Oil and Asphalt Co.

M. W. Kibre, superintendent of the gas department at Vernon, has been named assistant manager of the gas department.

H. A. Sting, gas engineer at Vernon, has been appointed superintendent of the gas department, southern division, with headquarters at Vernon.

A. C. Lyles has been promoted from chemist at the Santa Fe Springs gas laboratory to gas engineer in charge of the "Springs" gas laboratory.

Utah Oil Refining Sets Aviation-Fuel Record

CHICAGO. — Utah Oil Refining Co., subsidiary of Standard Oil Co. (Indiana), has established a world's record in production of aviation gasoline, according to figures presented by A. W. Neeley, chief chemist for Utah, at a joint technical meeting here of the Indiana Standard group of companies. Neeley said 100-octane production at the Salt Lake City refinery amounts to more than 40 per cent, calculated on the crude-oil run. Blending agents imported from other refineries raise the total about 45 per cent. Neeley explained that the high production of fighting-grade fuel is due to good performance of certain war-plant installations.

"We have a small refinery," he said, "with a capacity less than a tenth that of the big refinery at Whiting, Ind. One of our rather large pieces of equipment, however, uses the new process which the Indiana Standard perfected early in the war for making a high-octane component known as neohexane. Availability of this ingredient is largely responsible for our large output of aviation gasoline. And neohexane will be especially valuable in the improved superfuels which are being developed."

Test Runs Started at Plant Moved From Gainesville

OKLAHOMA CITY.—Denver Producing & Refining Co. has started test runs at its refinery between Britton and Edwards, on the Santa Fe Railway. This 2,500-bbl. skimming plant, moved from Gainesville, Tex., had been idle about 6 years. It will operate on West Edmond crude from the company's own wells.

Products will be distributed in the Greater Oklahoma City area.

V. H. Rowe, formerly with Continental Oil Co. and Kerlyn Oil Co., is refinery superintendent. It is planned to install a cracking plant as soon as materials are available.

OPA Extends Restrictions On Residual-Oil Rations

WASHINGTON.—Restrictions on the issuance of residual-oil rations, already in effect in all other areas, were extended on June 29 to the Midwest region by Office of Price Administration, owing to severely reduced supplies of residual fuel oil.

Issuance of residual oil rations in the Midwest is limited to two-thirds of normal requirements for heating purposes and to heat water. Formerly these users were given rations for full normal needs. The basic ration for users of other grades of fuel oil is also about two-thirds of normal requirements, the agency said. Residual oil is the heavy type used principally for industrial purposes and for heating large buildings.

Residual fuel-oil stocks in the states affected are now at the lowest level reached during the last 5 years. The entire country's stocks are about 11,000,000 bbl. less than a year ago.

Lead Shortage Precludes Higher-Octane Gasoline

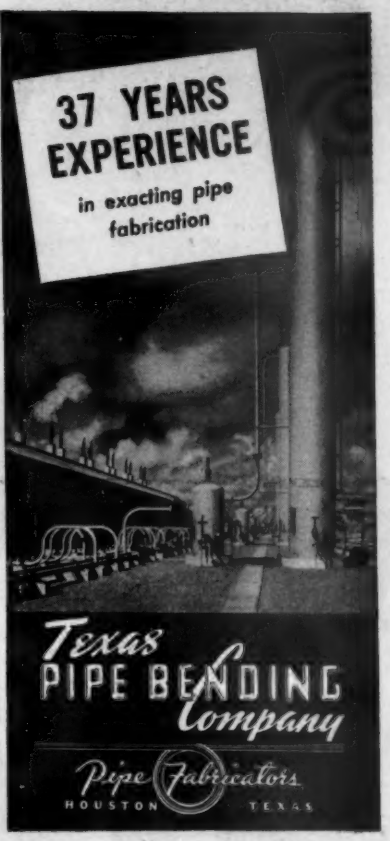
NEW YORK.—Although Ethyl Corp.'s stocks of ethyl fluid are at an all-time high, it is impossible at this time to allocate more tetraethyl lead to improve the quality of civilian gasoline or increase the quantity ratios for premium grade, according to the director of refining and the director of distribution and marketing for Petroleum Administration for War. To preclude misunderstanding of the reasons for this situation and to make clear Ethyl Corp.'s cooperation with PAW and War Production Board, E. W. Webb, the company's president, has issued the following statement:

"The production of ethyl fluid is a complex and highly integrated process in which many different chemicals are involved. A shortage of any raw material or intermediate chemical limits production in exact proportion to its availability. At present, the raw material in greatest shortage is metallic lead. The amount of metallic lead allocated to the Ethyl Corp. each month is determined by WPB on the basis of military and essential civilian requirements.

"Metallic lead is used for many essential purposes. In allocating it for improving civilian gasolines, WPB, with the cooperation of PAW, has in the opinion of the management of Ethyl Corp. shown excellent judgment on the basis of all available facts. It is true that the inventory of ethyl fluid in our storage tanks is at an all-time high, and our capacity for production is somewhat greater than the present production. However, the Army and Navy Petroleum Board considers it necessary to maintain our present inventory and that in refiners reserve storage at the present level. We do not expect additional metallic lead to be allocated for the manufacture of ethyl fluid to be used to improve present standards of civilian gasoline until there has been a substantial lessening of military requirements for lead products. That decision must, of course, remain with the Army and Navy."

We design and construct all types of modern refining units.
★ Serving The Industry Since 1915
BORN ENGINEERING CO.
Tulsa, Oklahoma

FOR A GOOD, HONEST WATER CONDITIONING JOB... LARGE OR SMALL
Call
JOHN FIELD-MAN
ON YOUR NEXT WATER CONDITIONING JOB
LELAND HAMNER CO.
LELAND HAMNER CO.
P. O. Box 10[illegible] Capitol 2778 Long Distance LD 2175
2211 PRESTON AVE. HOUSTON, TEXAS



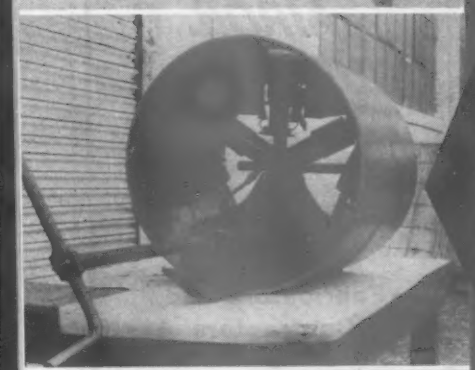
OIL and GAS
BURNING EQUIPMENT
NATIONAL
AIROIL
BURNERS
1236 E. Sedgley Ave.
PHILADELPHIA 34, PENNA.

Steel Plate
Fabricators and
Contractors
•
Products storage
•
Pressure vessels
McNAMAR
BOILER & TANK CO.
Tulsa, Okla

Line-up clamp, with fingers extended, is inserted in one length of pipe. Fingers center the welding groove with respect to bevel edge of pipe.

Rotation of the crank expands the small shoe at the top thus locking the clamp in correct position in the pipe. The fingers are now retracted.

Pipe containing clamp is brought sufficiently into line to allow the protruding half of the clamp to be inserted into the adjacent pipe in preparation for the line-up operation.



The main shoes are now expanded. The small auxiliary shoe is retracted. The pipes are hydraulically forced into perfect circles and exact alignment for welding.

This is a view of the completed alignment operation showing the outside of the pipe at the joint. Note the absence of obstructions to welding rods.

Price-Elliott

LINE-UP CLAMP

An pipelines grow longer, pipe larger, and speed more essential in construction, the Price-Elliott inside line-up clamp becomes a MUST for the pipeliner who prides himself on an organization that really gets the job done.

Here is a clamp with hydraulic mechanism entirely contained and concentrated at the clamp itself. The actuating crank is connected to the hydraulic unit by a series of torsional rods so that any length of pipe can be handled.

The actual, untouched photographs at the left will serve fully to acquaint the reader with the efficiency and time saving qualities of the Price-Elliott, and full particulars and lease charges may be obtained by contacting us.

Exclusive Distributors

PERRAULT Brothers

PIPE COATING AND WRAPPING MACHINES
PIPE LINE SUPPLIES
1330 NORTH BOSTON — TELEPHONE 2-1104
TULSA 6, OKLAHOMA

PIPE LINES

FPC Postpones Panhandle Eastern Hearing

WASHINGTON. — Federal Power Commission has postponed until 10 a. m., September 18, the hearing previously set for June 20 on Panhandle Eastern Pipe Line Co.'s application for authority to export 33,000,000 ft. of natural gas daily to Canada.

In its postponement order, FPC points out that under the terms of the War Production Board order of May 29, 1945, Panhandle Eastern is not to make any deliveries of gas to Canada until it has delivered 9 billion cubic feet to Ohio Fuel Gas Co. during the period from April 1 to October 31, 1945. The WPB order also states that no new deliveries of gas are to be made to Canada by Panhandle Eastern during January, February, March, and December of any year.

This indicates that if FPC grants the authority to export, little, if any, gas could be delivered to Canada until April 1946, except for a possible period in November of this year. The commission is now examining rate schedules covering rates and charges over Panhandle's entire pipe-line system, as the result of its order of September 23, 1942, requiring reduction of Panhandle's rates. This order has been affirmed recently by the Supreme Court.

Permit Granted for 68-Mile Oil Line

Wyoming Public Service Commission has granted Stanolind Pipe Line Co. authority for the construction of a 68-mile 8-in. oil line from the Maverick Springs field, Fremont County, through Steamboat Butte, Pilot Butte, and Winkelman fields to a junction with its Elk Basin-Casper line near Lysite. The certificate also authorized a 27-mile 6-in. line to take off from the main line and run to the Husky Refining Co. plant at Riverton. Toronto Pipe Line Co., which sought to build an outlet from Steamboat Butte, where it is the sole operator, withdrew its application at the time the Stanolind filing was made. The revised plan submitted by the Stanolind company provided for a more extensive system which would serve a larger number of fields.

Sun to Build Line From Delhi Field to Terminal

SHREVEPORT. — Sun Pipe Line Co. has surveyed right-of-way for a 20-mile, 6-in. pipe line from the Delhi field, Richland Parish, northern Louisiana, to a barge loading terminal at Talla Bena on the Mississippi River. Pump station and two 55,000-bbl. storage tanks are to be constructed at the terminal. The only outlet for the field now is a small-capacity carrier to a rail loading rack at the town of Delhi.

Northern Natural Contracts Go to Anderson Brothers

Anderson Brothers, of Houston and Tulsa, have received contracts for two pipe-line jobs from Northern Natural Gas Co. One is for approximately 19 miles of 16-in. and 24-in. lines at Hugoton, Kans., and the other is for a 16-mile loop of 24-in. line with a major river crossing near Ellsworth, Kans. Construc-

SEND FOR THIS
New Book
ON
PROTECTIVE COATINGS

● This booklet describes Reilly Protective Coatings for pipe lines, storage tanks, towers, stacks, structural steel and other metal construction; also brick, cement and wood surfaces

REILLY TAR & CHEMICAL CORPORATION
Executive Offices: Merchants Bank Building
Indianapolis 4, Indiana
2513 South Damen Avenue, Chicago 8, Illinois
500 Fifth Avenue, New York 18, N.Y.

CRC

PIPE LINE CONSTRUCTION EQUIPMENT

CRUTCHER-ROLFS-CUMMINGS
Pipe Line Equipment and Materials
Houston, Texas, U. S. A.

MOLE
Pipeline
Cleaner

For BETTER cleaning of
CRUDE LINES
PRODUCT LINES
NATURAL GAS LINES

FOR DETAILS WRITE

Pipeline Cleaners Co.
Fort Madison, Iowa

adeco...

NOZZLE TESTER

Keeps Diesel Engines Running Efficiently

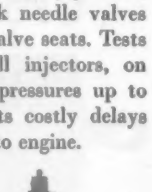
To keep diesel engines operating at peak efficiency, this portable, precision-built Adeco Nozzle Tester is indispensable.

Light in weight yet built for heavy-duty service, it enables any mechanic to make quick accurate tests on injector opening pressure, spray pattern, etc., and detect stuck needle valves and leakage around valve seats. Tests both large and small injectors, on bench or engine, at pressures up to 10,000 p. s. i. Prevents costly delays and possible damage to engine.

Ideal for testing hydraulic devices.

•

Write for bulletin on this practical, low-cost unit.



TESTS FUEL INJECTORS AND HYDRAULIC DEVICES at Pressures up to 10,000 p.s.i.

ADECO

AIRCRAFT & DIESEL EQUIPMENT CORP.

DEPT. 7: 4411 N. RAVENSWOOD AVE. CHICAGO 40, ILLINOIS

tion will be in charge of R. E. Wallace.

Anderson Brothers are completing four 8-in. lines across the Christian River for Sinclair Refining Co., pipe-line department. Trece Boyd is in charge of construction. The job, near Brunswick, Mo., has been shut down owing to floods. This contracting firm has partially completed approximately 300 miles of small-diameter screw pipe lines and other facilities for Northern Ordnance Co. at Pleasantville, Pa. Wilford Rose is superintendent.

Anderson Brothers have awarded 7½ miles of 20-in. pipe line, including various water crossings, for Arkansas Louisiana Gas Co. at Shreveport, to Claude M. Anderson, owner of Allied Welding & Engineering Co. They also have moved equipment back in to clean up the right-of-way on the 21 miles of 8-in. lines and gathering system and river crossing across the Trinity River for the Lone Star Gas Co. of Dallas, which was constructed during the winter. Water and mud conditions prevented the line from being cleaned up at the time of construction. Jim Rogers will be in charge of work there.

PAW Committee Studying Texas-California Project

HOUSTON. — Application of Pacific War Emergency Pipe Line, Inc., for permission to construct a pipe line from West Texas to Los Angeles has been taken under consideration by the pipe-line subcommittee of the District 3 supply and transportation committee of Petroleum Administration for War.

T. E. Swigart, chairman of the subcommittee, said that the committee, after close study of the question, will make its recommendations to the supply and transportation committee, which, in turn, will recommend to PAW what action should be taken.

FPC Will Consider Southern Application

WASHINGTON. — Application of Southern Natural Gas Co. Birmingham, for a certificate of public convenience and necessity to construct and operate additional natural-gas pipe-line facilities in Louisiana, Georgia, Alabama, and Mississippi will be considered by the Federal Power Commission here July 19.

The proposed facilities, estimated to cost $3,771,760, include approximately 116 miles of pipe line, a 1,200-hp. compressor station on the Montgomery - Columbus branch line near Wetumpka, Ala., and other minor facilities.

The company proposes to construct and operate 10 additional lengths of pipe line varying from 1 to 20.7 miles long, and including 75 miles of 22-in., 17 miles of 20-in., 13.2 miles of 12-in. and 10 miles of 6⅝-in. line. The program calls for increasing delivery capacity from the current 220,000,000 cu. ft. daily to 245,000,000.

Southern Natural owns and operates a natural-gas pipe line transmission system extending from gas fields in Texas and Louisiana to Atlanta, with branch lines extending to approximately 50 cities and towns in Alabama, Mississippi, and Georgia.

WHEN YOU WANT The *Best* IN PIPELINE CONSTRUCTION

OKLAHOMA CONTRACTING COMPANY

DALLAS TEXAS

SOUTH AMERICA
APARTADO 1085
CARACAS, VENEZUELA

NEW MAP

Jacobson's Map Showing Natural Gas Pipe Lines of the United States

Size 48" x 75" Scale 1" = 40 Miles

REVISED AND UP-TO-DATE

Jacobson's Map Showing Crude Oil and Gasoline Pipe Lines of the United States

Size 48" x 75" Scale 1" = 40 Miles

Post cards giving complete information and prices of above maps sent on request.

E. C. JACOBSON

801 McBirney Bldg.
Tulsa (3), Oklahoma

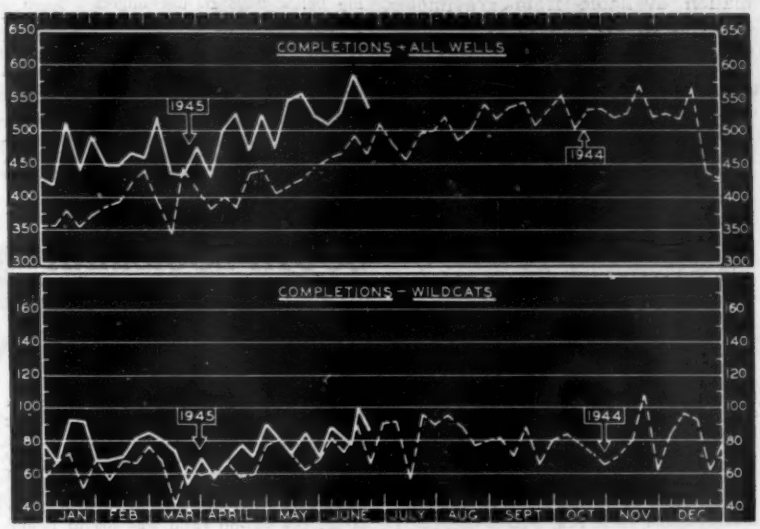
Exploration and Drilling

Week's Highlights

IT has been a little more than a year since the geophysicists publicly told the industry that no new oil-finding instrument was coming out of the wartime inventions in electronics. Both before and since, the story from numerous authoritative sources has always been the same—the most realistic path lies in hopes for better interpretation of the results obtained by the two main instruments in use, the gravimeter and the seismograph.

Now there is evidence that the gravimeter experts have been working quietly and making progress. At least two separate groups appear to have arrived at a method of interpreting results so as to give a fairly close estimate of the total mass of the body causing the anomaly recorded on their instruments. At first this would not appear to be of much use to the petroleum industry, although perhaps extremely valuable to the metallic mineral explorers. However, there are at least two important cases where such information would be useful in exploration.

These two cases are gravity anomalies resulting from salt domes and those caused by an igneous uplift. In many areas something is known of the regional geology, and a fair knowledge exists of the nature of the sedimentary section, at least to certain depths. Knowledge of the mass of the salt or the igneous rock in such cases would give a clue to its minimum depth by a process of deduction. The gravitational effects to be expected from the known sedimentary section could be computed. This would eliminate a part of the



Solid line charts current weekly completions, service wells in Eastern area included

WEEKLY WELL COMPLETION RECORD . . . WEEK ENDED JUNE 23, 1945

	Total of all wells					Cum. to date		Wildcat completions and discoveries					Cumulative total, 1945				
	Comp.	Oil	Gas	Dry	Footage	1945	1944	Oil	Dist.	Gas	Dry	Total	Oil	Dist.	Gas	Dry	Total
New York	32	16	0	*16	41,600	619	745	0	0	0	0	0	0	0	0	0	0
Pennsylvania	78	37	6	†35	138,400	1,795	1,732	0	0	0	0	0	0	0	0	0	0
West Virginia	17	2	13	2	50,729	379	395	0	0	0	0	0	0	0	0	0	0
Ohio	22	3	13	6	62,637	409	438	0	0	0	1	1	0	0	8	32	40
Indiana	10	4	1	5	16,266	85	100	0	0	0	4	4	2	0	0	14	16
Kentucky	11	4	2	5	15,226	203	307	1	0	0	3	4	14	0	2	21	37
Illinois	43	24	0	19	118,389	771	795	0	0	0	11	11	20	0	0	131	151
Michigan	20	4	1	15	52,820	362	284	0	0	0	9	9	5	0	2	122	129
Kansas	34	15	4	15	112,807	758	815	0	0	0	8	8	18	0	9	161	188
Neb., Mo., Iowa	0	0	0	0	0	12	15	0	0	0	0	0	0	0	0	9	9
Oklahoma	48	34	1	13	174,707	1,145	762	3	0	0	5	8	47	1	7	164	219
Texas	134	83	12	39	558,340	3,395	2,502	2	0	2	24	28	111	6	25	621	763
North Central	43	24	0	19	90,229	993	666	1	0	0	14	15	41	0	4	227	272
West	37	31	0	6	176,774	901	718	1	0	0	3	4	30	0	0	134	164
Panhandle	10	7	1	2	30,139	253	90	0	0	0	0	0	0	0	1	4	5
Eastern	4	1	2	1	23,266	153	158	0	0	0	1	1	5	3	0	42	50
Gulf Coast	30	19	4	7	195,507	783	509	0	0	1	3	4	26	2	15	130	173
Southwest	10	1	5	4	42,425	312	361	0	0	1	3	4	9	1	5	84	99
Louisiana	22	13	4	5	143,313	473	351	0	0	0	2	2	15	2	4	58	79
Northern	13	6	4	3	62,277	165	132	0	0	0	1	1	2	1	4	32	39
Southern	9	7	0	2	81,036	308	219	0	0	0	1	1	13	1	0	26	40
Arkansas	4	3	0	1	12,465	81	97	0	0	0	0	0	0	0	0	23	23
Mississippi	6	2	0	4	42,707	168	54	0	0	0	4	4	3	0	0	55	58
Southeastern States	1	0	0	1	5,796	24	15	0	0	0	1	1	0	0	1	16	17
Montana	6	5	0	1	19,652	150	141	0	0	0	0	0	7	0	0	10	17
Wyoming	1	1	0	0	4,655	87	76	0	0	0	0	0	8	0	0	17	25
Colorado-Utah	0	0	0	0	0	15	15	0	0	0	0	0	1	0	0	3	4
New Mexico	4	2	0	2	13,653	218	193	0	0	0	1	1	7	0	2	30	39
California	41	30	0	11	151,181	1,103	917	0	0	0	4	4	1	0	2	100	103
Total United States	534	282	57	195	1,735,343	12,252	10,749	6	0	2	77	85	259	9	62	1,587	1,917
Total previous week	586	302	61	223	1,197,818	11,718	10,143	8	0	2	90	100	253	9	60	1,510	1,832
Total June 24, 1944	452	262	34	156	1,474,583	10,749	7,680	7	2	2	55	66	187	16	57	1,423	1,683

Service wells included: *16, †33.

vertical section from consideration, and by comparison of the approximate mass of the source of the anomaly with the actual recordings, some fairly shrewd guesses could be made as to how much below the known section could be the salt or igneuos rock.

However, there are reports that still further advances have been made, and that one group has developed interpretation to the point where not only the mass of the body causing the anomaly can be determined, but also the depth. If this works out in actual practice as well as it seems to be in theory, there will be some valuable information available from gravimeter surveys. In the case of deep seated salt domes, in which the drill has never yet reached the salt, the geologist will have another check on how much sedimentary column remains between the deepest wells and the salt plug. The same thing will hold true of igneous uplifts, although ordinarily the commercial importance will not be so great.

EASTERN TEXAS

Pickton Field Gets Its First Failure

DALLAS.—The Pickton pool in southern Hopkins County had its first failure in Humble Oil & Refining Co. 1 Barber, Lazarin Survey. The well had no shows. Total depth was 7,932 ft. Shell Oil Co., Inc. and Lone Star Production Co. 1 Tandy, wildcat in the W. Martin Survey, Leon County, is fishing for drill pipe at 10,272 ft. in lime and shale. Humble 1 Leona Plantation, outpost to the Navarro Crossing field in Leon County, was drilling below 5,151 ft. in shale.

Smith County.—Delta Drilling Co. 1 Christian, Keys Survey, new producer for the Sand Flat pool, gaged 429 bbl. of 29.6° gravity oil in 24 hours through perforations at 7,023-53 ft. Total depth is 7,172 ft. Delta is preparing to drill 2 Christian, 933 ft. due east of 1 Christian. Sinclair Prairie Oil Co. 1 Shofner, projected 13,000-ft. wildcat on the south end of the Chapel Hill pool, was drilling below 10,114 ft., still in the Travis Peak.

Allen Whiteside 1 R. D. Smith, Vital Flores Survey, wildcat 6 miles east of Nacogdoches, Nacogdoches County, is dry at 1,200 ft. in sandy shale. Humble 1 Maness, Musquez Survey, wildcat 8 miles southeast of Rusk, Cherokee County, ran a drill-stem test from 7,850-75 ft., and had no shows of oil or gas. It was drilling below 8,065 ft. unchanged.

The Carthage field in Panola County led this week in completions with three. It also had three new locations while the New Hope field in Franklin County had two.

EASTERN TEXAS WILDCAT FAILURE

Bowie County: A. M. Sutton 1 J. G. Newkirk, Jesse Dean Sur., 8 mi. N Oak Grove, Travis Peak 3,508 ft., Paleozoic 4,175 ft., dry, TD 4,305 ft.

SOUTH LOUISIANA

Ritchie Field Producer Makes 117 Bbl.

NEW ORLEANS.—Nickols, Vincent & Welch have taken potential on its 2-B Acadia Parish School Board in the Ritchie field, Acadia Parish. The new producer, in 16-7s-1w, made 117 bbl. of oil through 5/32-in. choke in 24 hours. Producing from the Ritchie zone at 3,502-12 ft., the gas-oil ratio was 400 to 1, and oil tested 25° gravity.

William Helis 1-B Dearing Community, in 64-7s-1w of the University field in East Baton Rouge Parish, was completed for an initial production of 193 bbl. of 45° gravity oil through 6/64-in. choke from 48 holes at 9,668-9,678 ft. Tubing pressure was 2,175 lb., and gas-oil ratio 995 to 1. In the same area, Helis is drilling 3-B LSU in 65-7s-1w below 7,806 ft. and on June 18 spudded his 15 R. B. Nelson in 36-7s-1w.

Continental Oil Co. completed a new producer in the St. Martinville area of St. Martin Parish. The 1 Durand, 79-10s-6e, was drilled to total depth of 10,782 ft. but completed through perforations in 7-in. casing at 9,975-90 ft. Initial production was 47 bbl. daily through 12/64-in. choke. Gravity of the oil is 48° and tubing pressure 3,550 lb. Correlation indicates that the well was 234 ft. lower than the nearby 1 Liquidators.

Nine new field locations, one to a field, are reported for this week with Lafourche, St. Charles, and St. Mary parishes sharing the lead with two locations each. Completions and locations number the same with eight field wells (seven oil producers, one dry) and one dry wildcat completion. Calcasieu and Lafourche parishes each had two completions with Acadia, Beauregard, Iberia, St. James, and St. Mary parishes having one each.

WILDCAT FAILURE COMPLETED IN SOUTH LOUISIANA

Lafourche Parish: Stickney, Hawkins and Signal Oil & Gas Co. 1 LaGarde Unit, 26-15s-17e, dry at 10,230 ft.

MICHIGAN

Four New Wells Initial 3,200 Bbl.

SAGINAW.—Michigan operators completed 20 tests in the past week, 75 per cent of them ending in dry holes, as 19 new drilling locations were established.

Initial potential from the four new oil wells was 3,200 bbl. a day, most of it from two more heavy producers in Isabella County's prolific Coldwater field. There was 1 gas well on the list and 9 of the 15 dry holes were wildcat tests, among them Panhandle Eastern Pipeline Co.'s 4,864-ft. exploration in Section 11 of Handy Township, Livingston County.

Four of the new locations are in Isabella County, two each in Arenac, Clare, Allegan, Mecosta and Montcalm, one each in Bay, Genesee, Kalamazoo, Montmorency, and Newaygo.

MICHIGAN WILDCAT FAILURES

Allegan County, Ganges Township: Guy Wray 1 Eugene Sisson et al, SE NW NE 15-2n-16w, dry in Traverse limestone, TD 1,298 ft.

Monterey Township: Harris Oil Co.-Del Fortney 1 Effie M. Sutter, SW SW SW 15-3n-13w, dry in Rainbo, TD 1,590 ft.

Lake County, Cherry Valley Township: V. I. Cilley 1 Marcus A. Peisen, W½ NW NW NW 13-18n-12w, dry in Dundee, TD 3,541 ft.

Livingston County, Handy Township: Panhandle Eastern Pipeline Co. 1 E. C. Addison, C W½ NW NW 11-3n-3e, dry in Niagara, TD 4,846 ft.

Montcalm County, Sidney Township: Allegan Pipe & Supply Co. 1 Henry L. Greenwald, NE NE NE 22-10n-7w, dry in Dundee, TD 3,351 ft.

Newaygo County, Big Prairie Township: Michigan Consolidated Gas Co. 1 Pearl Sutherland et al, C NE 7-13n-11w, dry, TD 1,050 ft.

Osceola County, Leroy Township: Fisher-McCall Oil & Gas, Inc. 1 Lloyd Cool, C S½ SE SW 5-19n-10w, dry in Monroe, TD 3,850 ft.

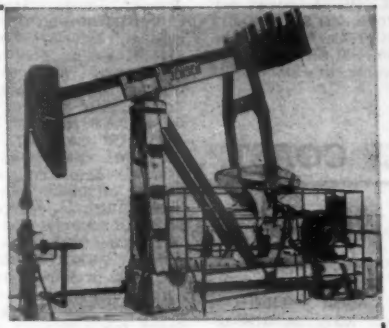
Van Buren County, Keeler Township: Clapsaddle Drilling Co. 1 Melvin

DAILY AVERAGE PRODUCTION FOR WEEK

	June 23 crude oil	Distillate, allied products	June PAW quota all oils	June 16 crude oil
Alabama	700	.....	400	700
Arkansas	79,650	5,000	85,400	78,700
California	950,750	60,200	1,007,200	947,250
Colorado	12,000	.....	10,500	11,500
Eastern	64,700	6,400	70,600	62,250
Illinois	205,800	12,000	212,000	200,200
Indiana	13,100	.....	13,000	12,000
Kansas	276,500	4,100	278,100	275,150
Kentucky	30,500	2,200	30,200	29,800
Louisiana	368,150	42,500	402,500	368,000
North Louisiana	69,200	.....	.....	69,050
South Louisiana	298,950	.....	.....	298,950
Michigan	46,550	700	47,700	48,150
Mississippi	50,600	.....	53,000	52,000
Montana	23,050	300	23,300	23,100
Nebraska	900	.....	1,000	900
New Mexico	104,300	5,000	110,000	104,300
Oklahoma	384,300	28,000	398,000	396,350
Texas	2,180,450	163,000	2,333,000	2,180,450
East Texas	377,600	.....	.....	377,600
East Central Texas	139,900	.....	.....	139,900
North Central Texas	154,650	.....	.....	154,650
Texas Panhandle	90,000	.....	.....	90,000
West Texas	497,550	.....	.....	497,550
Southwest Texas	357,700	.....	.....	357,700
Texas Gulf Coast	563,050	.....	.....	563,050
Wyoming	102,650	3,100	116,600	101,450
Total United States	4,894,650	332,500	5,192,100	4,882,250
Change from previous week	up 12,400			

Total production January 1-June 23, 1945	833,873,300 bbl.
Same period last year	680,760,460 bbl.

Why JENSEN makes you more money



JENSEN Pumping Units are likely to make wells more profitable and less troublesome because we have planned it that way for more than 25 years. We make nothing but pumping equipment. It has to be good.

We don't expect you to rush out and buy Units. But we do hope you'll ask owners, check JENSEN installations, talk with field men, get JENSEN conscious. Sooner or later you'll buy JENSEN Units.

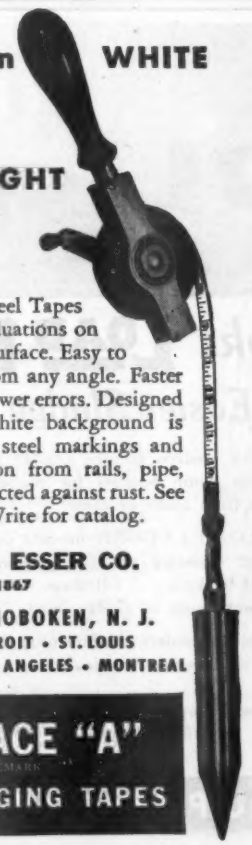
JENSEN

BROTHERS MFG. CO.

Coffeyville, Kansas, U. S. A.

Export Office: 50 CHURCH STREET, NEW YORK CITY

BLACK on WHITE for BETTER SIGHT



WYTEFACE "A" Steel Tapes have *raised* black graduations on a crack-proof white surface. Easy to read in any light, from any angle. Faster measurements with fewer errors. Designed for hard service. White background is protected by raised steel markings and rims. Resists abrasion from rails, pipe, rocks, concrete. Protected against rust. See your supply house. Write for catalog.

KEUFFEL & ESSER CO.

EST. 1867

NEW YORK • HOBOKEN, N. J.

CHICAGO • DETROIT • ST. LOUIS

SAN FRANCISCO • LOS ANGELES • MONTREAL

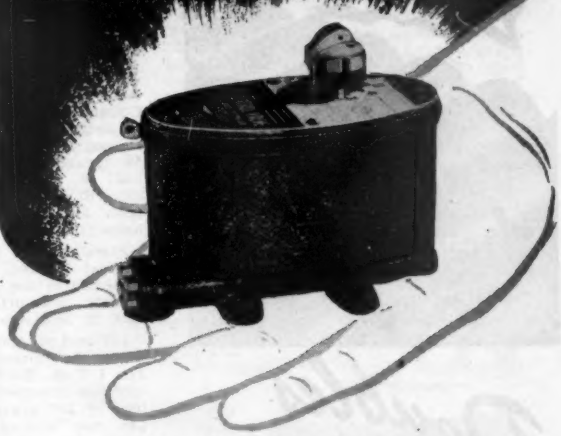
K+E

Drafting Reproduction Surveying Equipment and Materials Slide Rules Measuring Tapes

WYTEFACE "A" TRADEMARK STEEL GAUGING TAPES

THIS IS THE

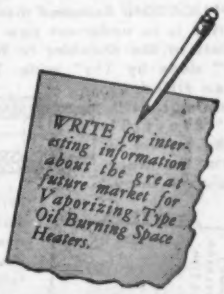
CONSTANT LEVEL OIL CONTROL . . .



. . . THAT MAKES PRACTICAL VAPORIZING TYPE GRAVITY FED OIL BURNING EQUIPMENT

Because of this efficient and dependable Constant Level Oil Control bearing the "A-P" nameplate, a tremendous present and potential market exists for oil companies supplying vaporizing burner fuel oil to millions of owners of Gravity Fed Space Heaters, Water Heaters, Floor Furnaces and Furnaces.

The majority of vaporizing gravity fed oil-burning appliances now in use are equipped with this efficient, reliable "A-P" Constant Level Oil Control, and it will be standard equipment on hundreds of thousands of additional units scheduled for early postwar production.



AUTOMATIC PRODUCTS COMPANY

2438 North 32nd Street

MILWAUKEE 10, WISCONSIN

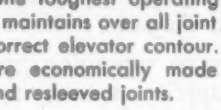
AP DEPENDABLE *Oil Controls*

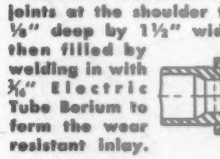
Doubles tool joint life

For fifteen years Tube Borium has been used on drilling bits to increase cutting speeds and drill more out-to-gauge hole. Now you can use this same alloy to greatly prolong the life of your tool joints!

An exceedingly small quantity of Tube Borium welded in a ring around the shoulder not only doubles tool joint life—even under the toughest operating conditions—but maintains over all joint strength and correct elevator contour. Applications are economically made on both new and resleeved joints.

APPLICATION: Accepted method of application is to under-cut new or resleeved joints at the shoulder to form a recess ⅛" deep by 1½" wide. The recess is then filled by welding in with 3/16" Electric Tube Borium to form the wear resistant inlay.





Write for this special Stoody engineering bulletin describing in detail hard-facing procedures on tool joints—no obligation.

STOODY COMPANY
1138 WEST SLAUSON, WHITTIER, CALIF.

STOODY HARD-FACING ALLOYS
Retard wear... Save Repair

Dammeffel, SE NE NW 18-4s-16w, dry in Traverse limestone, TD 925 ft.

Pine Grove Township: Carl E. Grimes 1 Way & Uramkin, SE SE SW 35-1s-13w, dry in Traverse limestone, TD 1,300 ft.

TEXAS GULF COAST

Harris County Wildcat Flows 87 Bbl.

HOUSTON.—A new wildcat producer 6 miles northeast of Katy in Harris County, is Josey-Bruton 1 D. Rorick, Jr. in Section 31 of HT&C Survey. This test flowed a 24-hour potential of 87 bbl. of 55° gravity condensate, tubing pressure 1,887 lb., casing pressure 2,157 lb., gas-oil ratio 67,429 to 1. Total depth is 7,556 ft., with 5½-in. casing perforated with 40 holes from 7,040-48 ft.

Standard Oil Co. of Texas 1 State, a wildcat failure, 12 miles southwest of Anahuac in the Mayes area of Chambers County, was drilled to a total depth of 8,320 ft. and was dry.

ElTex, Ltd. completed two new producers in the Spring field of Harris County. The 1 T. A. Binford in Wiley Smith Survey was completed for a potential of 27 bbl. of 38° gravity oil per day. Top of pay was encountered at 6,218 ft. Total depth was 6,507 ft. Production is from 30 perforations at 6,231-40 ft. Tubing pressure was 1,675 lb., and gas-oil ratio 6,660 to 1. The second producer completed was 4 E. L. Bender Estate, in the M. C. Bulrice Survey, for a potential of 25 bbl. of 37° gravity oil through 32 perforations at 6,247-252 ft. Total depth is 6,270 ft., with top of pay at 6,246 ft.

Humble Oil & Refining Co. A-29 "L" Ranch, Lolita field, Jackson County, flowed 11 bbl. on a 1-hour production test through 3/16-in. choke, tubing pressure 500 lb., casing pressure 1,200 lb., gravity 27°, gas-oil ratio 280 to 1. This production is from perforations at 5,284-90 ft. Total depth 5,310 ft., with 5½-in. casing set at 5,308 ft.

Sun Oil Co. 15 D. H. Braman, in the North Markham field of Matagorda County, was completed flowing 80 bbl. of 35° gravity oil in 24 hours through a 9/64-in. choke. With top of pay at 7,820 ft., total depth is 8,800 ft. and 5½-in. casing is set on bottom. Operators perforated with 28 holes at 7,820-27 ft. Gas-oil ratio 3,784 to 1, tubing pressure 1,124 lb.

Humble 6 Sodak, in A. Viesca Survey, Livingston field, Polk County, was completed for a 24-hour potential of 190 bbl. of oil, 36° gravity, through ¼-in. choke. Completed through 71 perforations at 6,222-40 ft. the gas-oil ratio was 389 to 1, tubing pressure 250 lb., and casing pressure 625 lb. In the same field, Gem Oil Co. completed 10 Davis Holmes, A. Viesca Survey, for a 24-hour potential of 154 bbl. with tubing pressure 250 lb., and gas-oil ratio 315 to 1. Production is from 45 perforations at 6,111-126 ft. Total depth is 6,150 ft. and top of the pay 6,111 ft.

Of the 10 new locations this week 2 were wildcats, 1 each in Chambers and Fort Bend counties. Jefferson County led in total number of locations with two in Fannet field and one in North Lovell Lake field. Completions total 14 with 12 field wells and 2 wildcats, Livingston field, Polk County, leading with 3 producers. More drilling was done in Harris County with five completions, two being wildcats, one dry and one discovery.

SUCCESSFUL WILDCAT COMPLETION IN GULF COAST TEXAS

Harris County: Gas-condensate discovery—Josey-Bruton 1 David Rorick, Jr. Sec. 31, H&TC Sur., 6 miles northeast of Katy, TD 7,556 ft., 5½-in. at 7,352

Save Trucks

Conserve Manpower

with the Brooks **LOAD LUGGER**

For Easier Sludge Handling

Write for Folder

Use the modern Brooks LOAD LUGGER with detachable dump buckets for the efficient disposal of sludge from tanks or cars.

The LOAD LUGGER mounts on the truck chassis without changing the frame. One unit can service several buckets . . . fill them at the tank, then hoist, haul and dump at sludge pond.

This is the modern method used at refineries, storage yards and marine terminals.

2406 Davenport Road, Knoxville 8, Tennessee
Distributors in all Principal Cities

Brooks EQUIPMENT AND MFG. CO.

ft., perf. 40 holes 7,040-48 ft., PT 87 bbl. condensate daily, 5,874,000 cu. ft. gas through 3/8-in. choke, gas-oil ratio 67,429 to 1, TP 1,887 lb., CP 2,157 lb., gravity 55°.

WILDCAT FAILURES COMPLETED IN UPPER GULF COAST TEXAS

Harris County: H. C. Cockburn 1 W. R. Reid, T. S. Lubbock Sur., 15 miles north of Houston, dry at 4,092 ft.

Wharton County: H. C. Cockburn 1 T. M. Neal and C. Davis, J. Smith & McKenzie Sur., 3 miles west of Magnet, south of Magnet field, dry at 6,232 tf.

APPALACHIAN FIELD

Washington Co. Test to Be Plugged Back and Shot

PITTSBURGH.—In North Strabane Township, Washington County, Pennsylvania, the test of Beedle et al on Grant and Hugh Boyles farm was drilled through the Gordon sand which had a showing of less than 1 bbl. of oil. Drilling was continued to 2,800 ft. and the Fifth sand appeared missing. It will be plugged back to the Gordon sand and shot. This test is located 1,500 ft. N-60-W of the good oil well on George B. Ackroyd farm and appears to limit possible production to the west. Tests are drilling north and south of the Ackroyd farm.

In Armstrong County, there are two new locations for tests; in Greene County one new location and in Washington County two new locations, all in gas areas.

In West Virginia, the test of United Carbon Co. 1,256 Rex Hutchison in Ripley district was completed with a final open flow 1 hour after shot of 2,058,000 cu. ft. gas. The Big lime was at 1,751 ft., Cornif-erous lime 4,723 ft., Oriskany 4,820-44 ft., total depth 4,875 ft. In Ravenswood district, Jackson County, Dr. E. C. Hartman et al completed a test on Edward M. Knotts farm in the undeveloped Berea oil pool which has been dormant for some time. It is showing for 15 bbl. a day, total depth 2,445 ft.

In Wyoming County, United Producing Co. completed 1,241 W. M. Ritter Lumber Co. in Center district good for 1,784,000 cu. ft. gas. The Maxton sand was at 1,900 ft., Big lime 2,201 ft., Injun 2,640 ft., Berea 3,278-3,308 ft., shot 3,288-3,304 ft., total depth 3,313 ft.

In Wayne County, United Fuel Gas Co. acidized 5,578 J. L. Caldwell in Lincoln district and the Big lime gas increased from 368,000 to 1,704,000 cu. ft. from total depth of 1,669 ft.

In Kanawha County, Columbian Carbon Co. is testing the Salt sand gas in a test 794 C. W. Caldwell in Union district which showed 311,000 cu. ft. and a rock pressure of 265 lb. in 1 hour from a total depth of 930 ft.

In Grant district, Nicholas County, Columbian Carbon Co. topped the Big lime at 2,270 ft. in the wildcat on J. V. Summers farm and is drilling ahead. In Nuttall district, this company's test on Franklin Real Estate Co. is drilling at 1,102 ft. with gas showing in the Red Rock at 1,029-81 ft., which blew down from 146,000 to 15,000 cu. ft.

In West Virginia, five new locations were announced during the week, all in proven areas in Boone, Calhoun, Doddridge, and Lincoln counties.

NORTH CAROLINA

MOREHEAD CITY, N. C.—The first Floyd J. Karsten exploratory oil well at Laughton's Point, 5 miles from here, has been stopped after being drilled to a depth of around 4,300 ft. What results obtained, if any, have not been announced though it is rumored that "some" gas and oil was found, but not in commercial quantities.

Officials of Coastal Plains Co., lessors of substantial property in this area, say a fresh attempt will be made immediately, perhaps in this vicinity.

SOUTHWEST TEXAS

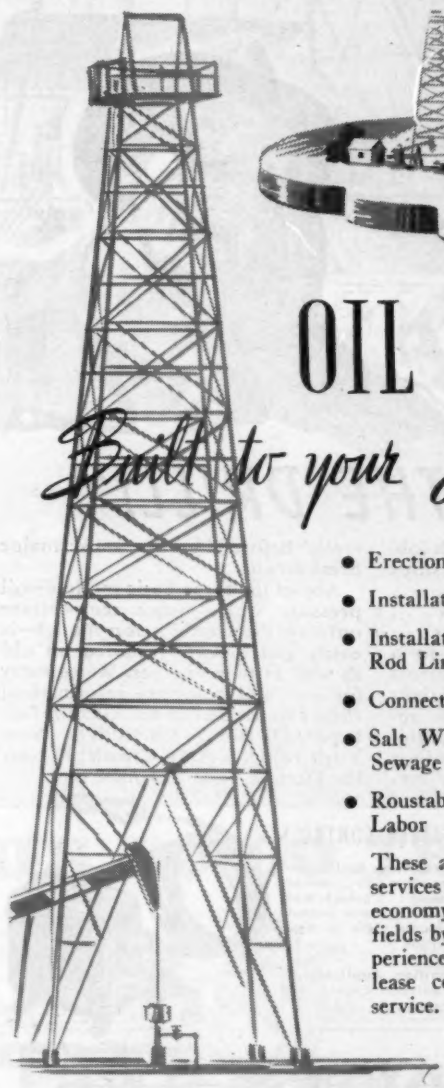
Gas-Condensate Discovery In Bee County

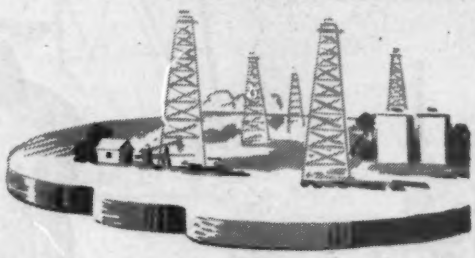
CORPUS CHRISTI.—New gas-condensate discovery for Bee County in Navarro Oil Co. 1 Forest A. Dahl, 3½ miles northwest of Petus, in the George Fagan Survey. On a potential test, well flowed 2,110,000 cu. ft. of gas per day and 2 bbl. of condensate per hour, through a 3/16-in. choke. It flowed 1,420,000 cu. ft. gas per day on 11/64-in. choke. The production is from 24 perforations at 6,985-93 ft. Total depth is 7,012 ft., 5½-in. casing set at 6,780 ft., and 5-in. liner to 6,995 ft.

Santa Clara Oil Co. (Cox & Hamon) 3 Clara Driscoll, wildcat, 13 miles northwest of Benavides, in the Santa Rosalia Grant, Section 55, Duval County, on final gage, through 36 perforations at 3,160-66 ft., flowed 12,000,000 cu. ft. of gas per day on open flow test. Total depth is 3,218 ft., with 5½-in. casing at 3,218 ft.

Panal Oil Co. 1 Lillie May Baird, wildcat, 6 miles north of Rio Grande City, in Porcion 82, Share 4-A, Starr County, gaged 4,800,000 cu. ft. of gas per day on open flow test through 30 perforations at 1,134-44 ft. Total depth is 1,713 ft., with 5½-in. casing set at 1,526 ft.

Texas Pacific Coal & Oil Co. 1 Murr, wildcat, in the northwest portion of Kimble County, in Z. H. Short Heirs Survey





OIL FIELDS

Built to your Specifications

- Erection of Derricks
- Installation of Pumping Equipment
- Installation of Central Powers and Rod Lines
- Connecting Wells and Tank Batteries
- Salt Water Disposal Systems and Sewage System
- Roustabout and Lease Maintenance Labor

These are a few of the construction services performed with efficiency and economy throughout the major oil fields by our crews. Our 25 years experience brings you the most complete lease construction and maintenance service.

MAHAN, McCARTY & BESSE, INC.

"Building It Right Is Our Reputation"

HUNT BUILDING TULSA, OKLAHOMA

97, Abstract 468, was dry at total depth of 4,473 ft. in Ellenburger lime. The Ellenburger was topped at 3,840 ft.

Fred W. Shield and Allen-Morris 1 F. B. Rooke & Sons, Heard field, Refugio County, Refugio Town Tract, flowed 122 bbl. per day through ⅛-in. choke, tubing pressure 700 lb., casing pressure 1,000 lb., no water, gas-oil ratio 785 to 1, through 16 perforations at 6,217-21 ft. Total depth is 6,222 ft., with 5½-in. casing set on bottom.

The South Texas Geological Society has announced the name "Albert West" has been given the field discovered by Continental Oil Co. 2-A Albert West, 1½ miles southeast of Kittie, Live Oak County, in the M. Cronican Survey, Abstract 135. This was originally the George West Estate 2.

Of the 47 new locations this week 5 were wildcats, 1 each in Calhoun, Duval, Karnes, McMullen and Victoria counties. Willamar and Seelingson fields led in total number of locations with Willamar having 13 and Seeligson 7. Completions total 26 of which 5 are wildcats, with only 1 discovery. Starr County leads in completions with three gas wells in Garcia field and one gas and one dry in Cameron field.

SUCCESSFUL WILDCAT COMPLETIONS SOUTHWEST TEXAS

Starr County: Gas discovery—Panal Oil Co. 1 Lillie May Baird, Porcion 82, Share 4-A, 6 miles north of Rio Grande City, total depth 1,713 ft., perf. 30 holes, 1,134-44 ft., PT 4,800,000 cu. ft. gas day, open flow. Now shut in.

WILDCAT FAILURES COMPLETED IN SOUTHWEST TEXAS

Guadalupe County: Wiegand Bros. Drilling Co. 1 B. R. Ussery et al, W. G. Hunt Survey, 3 miles NE of Kingsbury, dry at 2,484 ft.

Cameron County: Magnolia 1-B Armendaiz, Ojo De Agua Grant, 2½ miles north of Combs, dry at 9,616 ft.

Jim Hogg County: Bridwell Oil Co. 1 Isabel R. De Gutierrez, Sur. 164, 12 miles SW of Hebbronville, dry at 4,012 ft.

McMullen County: Humble Oil & Refining Co. 2 E. M. Baker, M. F. Lowe Sur. 4, 17 miles NW of Geo. West, dry at 8,440 ft.

"STOP THE DRILL!"

• Tough words to hear on a rush job! But when the mud pump engine stops —so must everything else.

Install PENN Safety Controls . . . here and on your other engines . . . and hold such costly delays to a *minimum.* These automatic controls sound an alarm, flash a warning light or, if desired, shut down engine operation if the oil pressure or cooling water system fails. Thus minor troubles can be *discovered and corrected* before they can cause major breakdowns.

Any of the three basic models—oil pressure only, water temperature only, or the combination model—is easily and quickly installed on old as well as new engines. Write *today* for free and complete information! *Penn Electric Switch Co., Goshen, Ind.* Export Division: 13 E. 40th St., New York 16, U. S. A. In Canada: Powerlite Devices, Ltd., Toronto, Ont.

TYPICAL FUNCTIONS OF PENN SAFETY CONTROLS

Diesel Applications. Sounds an alarm only . . . closes magnetic fuel valve and sounds alarm . . . closes magnetic fuel valve only . . . closes magnetic fuel valve and opens pilot relay.

Battery Ignition Applications. Opens battery circuit and sounds an alarm . . . sounds an alarm only . . . opens battery circuit only.

Magneto Ignition Applications. Sounds an alarm only . . . grounds dual magneto . . . grounds magneto only . . . grounds magneto and sounds an alarm or lights a signal light.

Dual Ignition Applications. Opens battery circuit and grounds magneto.

Penn Combination Pressure and Temperature Control

PENN AUTOMATIC CONTROLS

FOR HEATING, REFRIGERATION, AIR CONDITIONING, ENGINES, PUMPS AND AIR COMPRESSORS

N. CENTRAL TEXAS

Sivel's Bend Outpost Gets Oil Show

WICHITA FALLS.—Sun Oil Co. 1 Mabel Field, 1-mile south outpost to the Sivel's Bend pool of north central Cooke County, cored sand showing oil from 6,675-86 ft. On a 20-minute drill-stem test from 6,675-86 ft., it made gas in 18 minutes and recovered 3,200 ft. of oil and 250 ft. of fresh water and mud. Bottom-hole pressure was 2,600 lb. It was drilling in sandy shale below 6,731 ft. Sussex Oil Co. 1 Wilday, west extension to the Wood Bend conglomerate pool of northwestern Clay County, drilled conglomerate showing oil from 6,026-39 ft. A 30-minute drill-stem test was run from 6,026-39 ft. and recovered 30 ft. of oil-cut mud. It then logged conglomerate showing oil from 6,091-6,104 ft. On a 30-minute drill-stem test at this depth, 32 ft. of oil-cut mud was recovered. Total depth is 6,200 ft. Electrical survey was run and 7-in. casing was set at 6,197 ft.

Jack County.—Continental Oil Co. 1 Roy Cherryhomes, wildcat 10 miles southeast of Jacksboro, was considered dry at 6,728 ft. after electrical survey was run. Continental 1 Borden, wildcat 5 miles southeast of Newport, logged dry sandy lime at 5,757-70 ft. It was drilling below 5,774-70 ft. in shale and lime. L. T. Burns of Wichita Falls has staked a 6,000-ft. wildcat 6 miles northwest of Antelope. It is 2 M. N. Garret, 2,296 ft. from the south line and 450 ft. from the east line of BBB&C Survey A-100. The 1 Garret was a shallow test.

The fields in this district with the majority of completions for the week are the Thornberry pool in Clay County with seven, the Sewell field in Jack County with two and the Holliday pool in Archer County with two. Electra field in Wichita County led in new locations with five and the Thornberry pool in Clay County and Muenster pool in Cooke County each had two.

In West Central Texas, the Coker pool in Coleman County had two completions. The Shackelford Regular pool in Shackelford County had four new locations; the Coleman Regular pool, Coleman County, had two.

NORTH CENTRAL TEXAS WILDCAT FAILURES

Archer County: C. G. Butts & R. W. Darden 1 W. C. Thomas et al, Blk. 5-S, N. Thomas Sur. A-454, 3 mi. W Archer City, elev. 1,011 ft., dry, TD 1,470 ft.

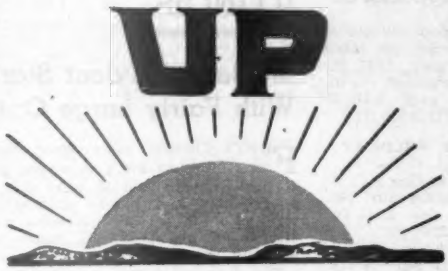
W. T. Hutcheson 1 Luke Wilson, Lot 366, H&TC Sur. A-1029, 6 mi. S Holliday, elev. 1,039 ft., dry, TD 1,625 ft.

Fortex 1 Morbitzer, Sec. 62, Blk. 3, Clark & Plumb Sur., 3 mi. SW Scotland, elev. 1,019 ft., Caddo 5,151 ft., dry, TD 5,305 ft.

L. Eric Jones et al 1 Daisy Slopansky, Blk. 64, Harris subd. of Club Ranch, 8 mi. W Archer City, dry, TD 1,470 ft.

Cooke County: S. D. Johnson 1 W. T. Bonner, A. Emanuel Sur. A-1196, 2½ mi. E and ½ mi. N Leo, elev. 848 ft., schist 2,193 ft., dry, TD 2,195 ft.

Montague County: Dan Hughes 1 Mrs. E. C. Edmondson, D. L. Wood Sur. A-842,



EVEN as the sun rises daily so do E-C Inclinometer rentals. From month to month goes the word—that this well surveying instrument gives the best results—in less time, less trouble and at less expense.

Write for details

SPERRY-SUN WELL SURVEYING CO.

Offices: Philadelphia, Pa.; Houston, Corpus Christi, Marshall, Odessa, Texas; Lafayette, La.; Long Beach, Bakersfield, Calif.; Oklahoma City, Okla.; Casper, Wyo.

STANDARD OF THE OIL FIELDS

Gotkool

WATER CANS & COOLERS

GOTKOOL WATER COOLER
Made in 2, 3, 5, 8, 10, 15 and 20 gallon sizes with Push-Button Faucet.

GOTT Water Coolers are the convenient way to keep drinking water handy to the worker, protect it from impurities. Their exclusive construction keeps water cool for long periods. Snug fitting large removable top, handy non-leaking push button faucet. GOTT Water Cans for handy field use. Your Supply Store has them, get one today!

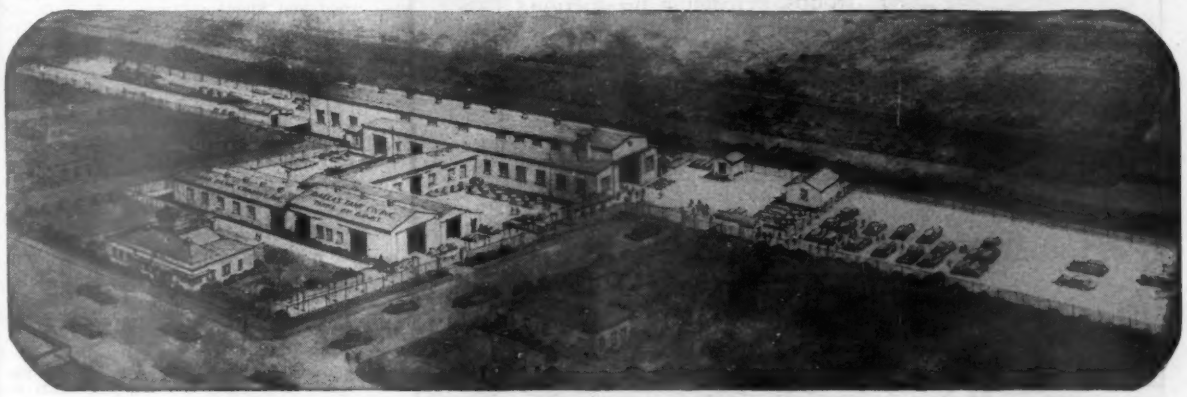
GOTKOOL WATER CAN
Made in 1½, 2, 3, 5, 10, 15 and 20 gallon sizes. Push-Button Faucet, or single additional cost.

H. P. GOTT MFG. CO.
WINFIELD, KANSAS

KEEP PURE DRINKING WATER ALWAYS HAND

INSIST ON THE GENUINE

Look for the Blue and Black Label with the name GOTKOOL in Red



FACILITIES TO DO THE JOB!

Manufacturers and fabricators of all types of welded sheet and steel plate products. Facilities to do the job whether large or small. Engineering skill backed by constant research.

All equipment is designed, manufactured and supervised by men who have had many years experience in steel plate construction.

TANKS BY BANKS

DALLAS TANK Company, Inc.

201-5 W. COMMERCE ST., P.O. BOX 5387, DALLAS, TEXAS

5 mi. W Spanish Fort, elev. 800 ft., dry, TD 851 ft.

Throckmorton County: Bridwell Oil 3 J. F. Cooke, B. C. Riley Sur. A-1325, 5 mi. N and 1 mi. W Ft. Griffin, dry, TD 1,336 ft.

Moore, White & Duncan 1-B White & Duncan, CIR Sur., Blk. 52, 8½ mi. N and 2 mi. W Ft. Griffin, elev. 1,382 ft., dry, TD 958 ft.

Moore, White & Duncan 1-C White & Duncan, Blk. 54, CIR Sur., 8½ mi. N and 2 mi. W Ft. Griffin, dry, TD 1,200 ft.

Wichita County: Waggoner, Closuit & Wood 1 Ed Foster est., SA&MG Sur. A-272, 3 mi. N and 6 mi. E Electra, dry, TD 2,072 ft.

Wood, Closuit & Knight 1 P. G. Krohn, Blk. 252, Waggoner Colony lands, 1 mi. E and 3 mi. N Electra, dry, TD 2,105 ft.

WEST CENTRAL TEXAS SUCCESSFUL WILDCAT

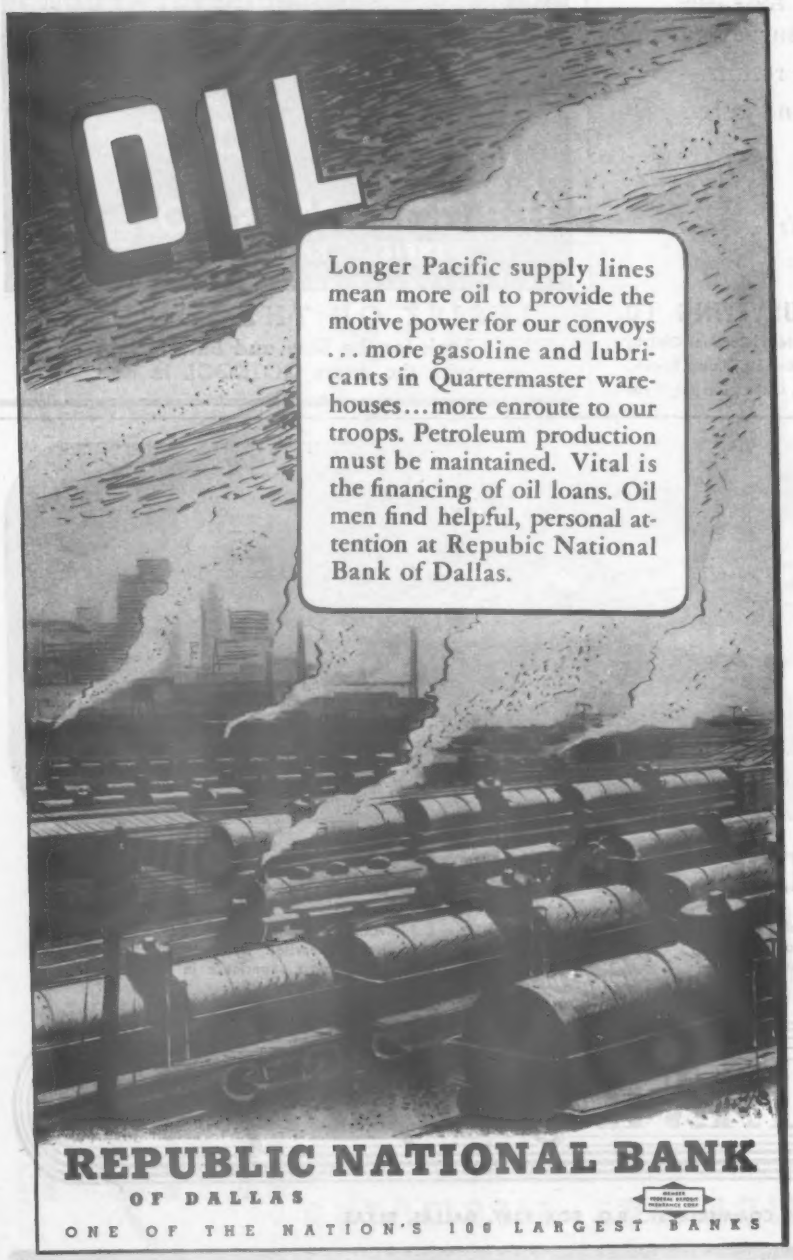
Coleman County: New oil pool—White & Newman 1 C. L. Gunn, Sec. 40, H&B Sur., 3 mi. SE Novice, elev. 1,987 ft., pumped 12 bbl. day through ¼-in. choke on 2-in. tubing, perf. 3,349-75 Jennings, gravity 42°, TD 3,515 ft.

WEST CENTRAL TEXAS WILDCAT FAILURES

Brown County: Central Texas Gas 1 C. E. Thompson, W. M. K. Dalton Sur. No. 57, Salt Creek gas pool, elev. 1,543 ft., dry in Ellenburger, TD 2,377 ft.

Stephens County: Sinclair Prairie 1 Oma Repass, Sec. 1066, TE&L Sur. A-413, 7 mi. SE Eliasville, elev. 1,104 ft., dry in Ellenburger, TD 4,733 ft.

Taylor County: Adler Oil et al 1 Sealy-Smith, Lot 15, Grimes CSL, 4 mi. S Merkel, elev. 1,851 ft., dry in Flippen, TD 2,646 ft.


OIL
Longer Pacific supply lines mean more oil to provide the motive power for our convoys ... more gasoline and lubricants in Quartermaster warehouses ... more enroute to our troops. Petroleum production must be maintained. Vital is the financing of oil loans. Oil men find helpful, personal attention at Repubic National Bank of Dallas.
REPUBLIC NATIONAL BANK
OF DALLAS
ONE OF THE NATION'S 100 LARGEST BANKS

ILLINOIS

Richland Wildcat Starts With Fairly Large Output

FORTY-THREE wells were completed in Illinois in the past week, of which 24 per oil wells and 19 were dry. Eleven of the dry holes were wildcats. Initial production of the 24 successful wells averaged 102 bbl. per well, which was below the year's average.

The largest of the completions was a 400 bbl. well, Illinois Mid-Continent Oil Co. 4 A. Hodgson, NW SW NE 11-3s-10e, Albion field, Edwards County, producing from Biehl sand at 1,984-90 ft. Perforations were made at 1,974-96 ft.

J. W. Carter 1 O. C. Borah, NW NE NW 20-2n-10e, a Richland County wildcat 2½ miles from production, flowed 386 bbl. in 14 hours from McClosky lime at 3,199-3,203 ft. which had been acidized. It flowed 152 bbl. in 12 hours on a subsequent test, and then flowed 12 bbl. per hour or 288 bbl. per day on the third day's test. West Parkersburg is the nearest pool to this important discovery. The well was not yet a completion.

Phillips Petroleum Co. 3 Kerwin, SE NE NW 21-6s-10e, Concord pool, White County, a near completion, swabbed 400 bbl. per day and then flowed 326 bbl. per day through perforations opposite McClosky lime at 3,037-46 ft. Phillips 1 Kerwin was a 1,250-bbl. initial producer completed in May.

Forty-one new operations were reported including 12 wildcats as follows: Fosterburg Drilling Co. 1 Bassett, NW NE NW 23-6n-9w, Madison County; P. Ravenstein 1 Wood, NW NW NW 36-1n-13w, Wabash County; Central Pipe Line Co. 1 N. Sweet, SW SE SW 12-6s-2e, Franklin County; Frank Strickland 1 Williams et al, NW NE NW 18-10n-3e, Shelby County; Kingwood and Sinclair Prairie 1 F. Volk, SE NE SW 20-5n-9e, Jasper County; The Texas Co. 1 Ahlof, SW SW SE 31-3n-1e, Marion County; Bell Bros. 1 C. W. Crickman, NW SW SE 15-3n-7e, Clay County; Max Conrey 1 M. Pierjok, NE SW NW 31-2s-1w, Washington County; Standard Drilling Co. 1 J. Cope, NW NW NE 33-2s-5e, Wayne County; Magnolia Petroleum Co. 1 Jansel, NW NW SE 18-4s-3w, Perry County; Texas 1 Jefferson Oil & Gas Co., NW SE SE 2-4s-1e, Jefferson County; Texas 1 P. Davis, SW NW NE 9-7s-5e, Hamilton County.

ILLINOIS WILDCAT FAILURES

Effingham County: Globe 1 C. Webster, SE SW SE 27-6n-6e, dry at 2,792 ft. Menard 2,052 ft., Cypress 2,426 ft., Benoist 2,578 ft., Aux Vases 2,647 ft., McClosky 2,740 ft.

Hamilton County: Texas 1 J. E. Jenkins, NW NW NE 9-5s-5e, dry at 3,521 ft. Menard 2,498 ft., Cypress 2,987 ft., Benoist 3,167 ft., Aux Vases 3,278 ft., McClosky 3,447 ft., St. Louis 3,511 ft.

Phillips Petr. 1 Holland, NW NW NE 13-4s-6e, dry at 3,500 ft., Menard 2,475 ft., Cypress 3,025 ft., Benoist 3,161 ft., Aux Vases 3,284 ft., McClosky 3,450 ft.

Jackson County: J. Pugh 1 P. M. Kimmel, SW SW SE 16-7s-14w, dry at 2,206 ft. Menard 1,355 ft., Cypress 1,828 ft., Benoist 1,973 ft., Aux Vases 2,088 ft., Ste. Genevieve 2,128 ft.

Jefferson County: Cherry & Kidd 1 C. Adams, SE SE NW 16-4s-3e, dry at 3,086 ft. Upper Glen Dean 2,361 ft., Barlow 2,599 ft., Aux Vases 2,806 ft., McClosky 2,920 ft., St. Louis 3,060 ft.

Marion County: W. H. McKain 1 T. L. Beard, SW SW SE 26-3n-4e, dry at 2,779 ft. Upper Kincaid 1,680 ft., Menard 1,945 ft., Cypress 2,366 ft., Benoist 2,518 ft., Ste. Genevieve 2,607 ft., McClosky 2,654 ft., St. Louis 2,779 ft.

Washington County: Aetna 1 R. Richard, NE NE SW 28-1s-1w, dry at 1,912 ft.

Cypress 1,494 ft., Benoist 1,595 ft., Aux Vases 1,686 ft., Ste. Genevieve 1,766 ft., Fredonia 1,909 ft.

Wayne County: Robinson & Puckett 1 Murphy, SW NE SE 6-1s-8e, dry at 3,275 ft. Glen Dean 2,569 ft., Cypress 2,771 ft., Benoist 2,998 ft., Ste. Genevieve 3,115 ft., McClosky 3,184 ft., St. St. Louis 3,211 ft.

Bell Bros. 1 H. T. Garrison, SW SW NE 5-1s-9e, dry at 3,017 ft. Menard 2,144 ft., Cypress 2,610 ft., Aux Vases 2,860 ft., McClosky 2,964 ft.

W. F. Lacey et al 1 P. Weber, SE SW NE 26-1n-9e, dry at 3,391 ft. Menard 2,388 ft., Cypress 2,870 ft., Weiler 2,998 ft., Benoist 3,074 ft., Aux Vases 3,176 ft., McClosky 3,264 ft.

Lucas Development 1 Roe Lucas, SE NE SW 7-1n-8e, dry at 3,148 ft. Upper Kincaid 1,952 ft., Cypress 2,710 ft., Aux Vases 2,965 ft., McClosky 3,106 ft., St. Louis 3,128 ft.

scheduled to drill plug this week. The hole filled 300 ft. with oil from Devonian lime at 1,389-92 ft. The well is 35 miles from production.

WESTERN KENTUCKY SUCCESSFUL WILDCAT

Henderson County: Sun 1 C. Hagerman, 4-Q-20, 1 mile south of Mt. Vernon, Ind. Aux Vases sand 2,598-2,614 ft., TD 2,631 ft., IP 26 bbl. per day.

WESTERN KENTUCKY WILDCAT FAILURES

Henderson County: Sun 1 B. A. Powell, SW¼ 21-O-22, dry at 2,662 ft. Lower Menard 1,795 ft., Cypress 2,288 ft., Benoist 2,432 ft., McClosky 2,650 ft.

McLean County: Sohio-Basin Drlg. 1 E. J. Floyd, 7-M-27, 4 mi. NW of Graham, dry at 1,915 ft. Vienna 1,212 ft., Barlow 1,491 ft., Renault 1,608 ft., McClosky 1,870 ft.

Union County: Farmer & Chenault 1 C. R. Markham, 24-M-19, 2½ mi. S of Sturgis, dry at 1,556 ft. Cypress 1,523 ft., Glen Dean 1,180 ft., Heidelberg 1,245 ft., Barlow 1,464 ft.

INDIANA

EVANSVILLE.—Four oil wells, one gas well and five dry holes were reported completed in Indiana in the past week. Carter Oil Co. may have opened a pool with 1 A. S. Cox, NW NW SW 14-7s-14w, in Posey County, 3 miles southwest of the Mt. Vernon pool, in Tar Springs sand at 2,077-80 ft., total depth 2,092 ft. On a drill-stem test the recovery was 720 ft. of clean oil, 60 ft. of oil-cut mud and no water.

INDIANA WILDCAT FAILURES

Posey County: Redwine et al 1 J. Aldridge, NW NW NE 3-7s-14w, dry at 2,933 ft. Lower Glen Dean 2,267 ft.,

OHIO, KENTUCKY

South Wayne Pool Extended to East

COLUMBUS.—Ohio Fuel Co. 1 H. D. Eppley, Section 9, Wayne Township, Muskingum County, came in at 1,950,000 cu. ft. natural, extending the South Wayne pool a location to the east. Clinton sand at 3,959 ft. was drilled to a total depth of 4,000 ft.

Preston Oil Co. 2 George E. Hauck, Section 2, Bedford Township, Meigs County, made 45 bbl. in the Berea sand at 1,603-1,613 ft. The producer, while not as large as the wells a mile to the north, will encourage drilling farther south.

Obermiller 1 E. Miller, Section 15, Knox Township, Columbiana County, the fourth well to reach to Oriskany sand, is drilling in the second sand without finding a pay.

The Stewart and Brush Creek fields led in the number of completions for the week, while the northern and Cambridge fields led in the number of new locations announced.

OHIO WILDCAT FAILURE

Perry County, Hopewell Township: Ohio Fuel 1 Noah Shelly, Section 10, Clinton, 3,013-3,034 ft., dry, Medina, 3,088-3,101 ft., dry, TD 3,117 ft.

EASTERN KENTUCKY

ASHLAND.—The week's operations in eastern Kentucky were centered in Floyd County, one completion netting an open flow of more than 1,000,000 cu. ft. of gas daily, and the other being marked up as a dry hole. One oil well was also completed.

Inland Gas Corp. completed No. 274, on the William Dingus property on Abbott's Creek in Floyd County, at a total depth of 988 ft., with a daily open flow of 1,639,000 cu. ft. of gas in Maxon sand.

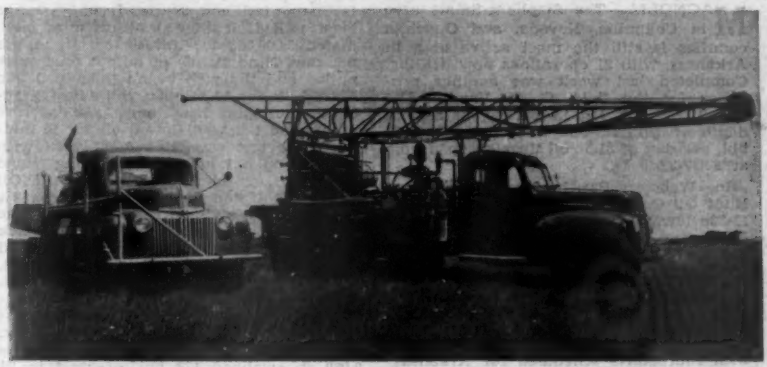
Kentucky-West Virginia Gas Co. completed No. 5,578 on the John Manns property on Lick Fork of Salt Lick Creek in Floyd County, at a total depth of 2,545 ft. as a dry hole.

Ashland Oil & Refining Co. completed No. 8 on the J. W. Gillem property in Elliott County at 840 ft. with a daily estimated production of 5 bbl. of oil.

WESTERN KENTUCKY

OWENSBORO.—Carter Oil Co. completed a 960-bbl. well in the Hitesville pool in Union County. The well is 1 Ed Culver, completed in McClosky lime at 2,548-51 ft. and 2,558-74 ft. It is the largest initial producer in recent days in the county.

Down in Todd County Ekirk Associates 1 M. Stimson, 8-D-29, near Elkton, was still a noncompletion. The crew was



THEY WILL GET
where they're going!

Many a truck starts out happily on an important mission, and when it does not arrive on schedule, the owner realizes that his truck lacked something to overcome conditions encountered en route.

The geophysical trucks used in petroleum exploratory work operate in open country, off the highways, in all types of weather, every month in the year. They must be prepared to go anywhere, any time.

That is why most of the producers buy standard production models and equip them with Fabco Dual Drives. That provides double the traction, double capacity, and maximum use of power through lower gear ratios. Write for new bulletin.

25 Years in this Business

Fabco

F. A. B. MANUFACTURING CO.

1249 SIXTY-SEVENTH STREET · OAKLAND 8, CALIFORNIA

Dual Drives · 6 and 10 Wheel Units · Logging and Highway Trailers · Frame Extensions

Barlow 2,498 ft., Ste. Genevieve 2,822 ft., McClosky 2,919 ft.

Indiana Farm Bureau 1 L. Coudert, SW SE NW 14-4s-12w, dry at 2,750 ft. No log.

Gibson County: Kingwood 1 B. A. Field, SE SE NW 13-4s-10w, dry at 2,222 ft. Upper Menard 1,326 ft., Barlow 1,779 ft. Ste. Genevieve 2,025 ft. McClosky 2,206 ft.

Perry County: Cokes and Matthews 1 M. Gleeson, SW SE NW 15-5s-2w, dry at 760 ft. No log.

LA.-ARK.

Stephens-Smart Has 21 Active Operations

MAGNOLIA.—The Stephens-Smart area in Columbia, Nevada, and Ouachita counties is still the most active area in Arkansas, with 21 operations now drilling. Completed last week was another producer for the field, G. H. Vaughn D-4 Smart, SE NW NE 13-15s-20w, at a total depth of 3,015 ft. The well is pumping 66 bbl. per day of 31.5° oil through open hole at 2,997-3,015 ft.

In Webster Parish, north Louisiana, Hunt Oil Co. 1 Roberts, discovery well in 11-23n-10w, flowed 106 bbl. of oil through ¼-in. choke on tubing from pay in the Pettit lime on the last test. On a previous test, it produced 51 bbl., tested again for 37 bbl., and then died. The pay depth is about 5,684 ft., plugged back depth, and total depth is 11,295 ft.

New locations remain about normal, with four starts scheduled for Arkansas, including one Miller County wildcat, and 8 new locations for North Louisiana, including two wildcats, one in Richland Parish and one in Claiborne Parish.

NORTH LOUISIANA WILDCAT FAILURE

Claiborne Parish: F. A. Callery 1 Williamson, SE SE NE 28-22n-7w, dry, TD 6,255 ft.

Western GEOPHYSICAL COMPANY

COMBINING in one organization the largest and most complete geophysical research facilities in the world together with unexcelled equipment, experienced field crews and proven interpretation technique, Western Geophysical Company meets every requirement of operators desiring a *complete* and well-rounded geophysical service.

Western's seismic and gravity crews are now operating in all parts of the United States and in South America. Western service is available for surveys in any part of the world. Inquiries are invited.

Western GEOPHYSICAL COMPANY
HENRY SALVATORI, PRESIDENT
EDISON BLDG., LOS ANGELES 13, CALIF.
FIRST NATIONAL BANK BLDG., DALLAS 2, TEXAS
CONGRESS ST., NATCHEZ, MISSISSIPPI

PERMIAN BASIN

Proposed 11,000-Ft. Wildcat Staked in Ector

MIDLAND.—Atlantic Refining Co. 1-A University, wildcat 6 miles west of the McElroy pool in eastern Crane County, on the fourth drill-stem test in the Devonian had a strong blow of air throughout. When 23 stands of pipe had been pulled, it flowed oil with an estimated 3,000,000 to 4,000,000 cu. ft. of gas per day. Nine stands of oil-cut mud were pulled and the well began to unload and flowed oil for 10 minutes with flow gradually declining. Nine more stands were pulled and the well flowed oil for 10 minutes. The test was from 8,700-40 ft. with the tool open 1 hour. It is drilling ahead a 8,785 ft. in chert and lime. Gulf Oil Corp. 1-E Upton Henderson, wildcat 2⅞ miles west of the Sand Hills district, Crane County, was completed at plugged back depth of 4,409 ft. for 2.98 bbl. of oil and 10.82 bbl. of water with 766,000 cu. ft. of gas in 3 hours. Total depth was 6,625 ft.

Continental Oil Co. D-1-133 W. R. Settles, deep discovery for the Howard-Glasscock field in southern Howard County, on test through perforations from 8,950-9,080 ft. swabbed 173 bbl. of fluid in 24 hours. Eighty-five per cent was 35.4° gravity oil and 15 per cent drilling fluid. On a later test through perforations from 8,910-9,120 ft., 107 bbl. of fluid was swabbed in 12 hours, 22 per cent drilling fluid. Operator is continuing to test through these perforations.

Ector County: Stanolind Oil & Gas Co. has staked a proposed 11,000-ft. wildcat in northwestern Ector, 15 miles northwest of the Goldsmith field. It is 1 Jessie Mae Cummins Cole, Section 5, Block 45, T-1-N, T&P Survey. Cities Service Oil Co. and Shell Oil Co., Inc. 1-D TXL, southeast offset to the Devonian discovery in the TXL pool, swabbed 15 bbl. of oil and 12 bbl. of salt water in 6 hours on an official test through perforations from 8,060-80 ft. Shell and Cities Service 1-B TXL gaged 1,988 bbl. of 38° gravity oil from 8,005-90 ft. Atlantic Refining Co. 1-A TXL, southeast offset to Rowan Drilling Co. 1 TXL, having shown for production in the Devonian, was drilling below 7,891 ft. in hard chert.

The three fields leading in completions the past week were the Slaughter field in Cochran and Hockley counties, the McElroy field in Crane County and the Fullerton field in Andrews County. Each had three completions. The Fullerton field had five new locations and the McCamey field, Upton County, had nine.

WEST TEXAS SUCCESSFUL WILDCAT

Andrews County: New oil pay—Chalmette Oil 1 Lake Shore Corp., Sec. 24, Blk. A-36, PSL Sur., Fullerton field, elev. 3,356 ft., pumped 40 bbl. day through 2-in., perf. 4,550-4,767 ft. San Andres, gravity 35.2°, gas-oil ratio 560 to 1, Fullerton 6,890 ft., TD 7,637 ft., PB 4,868 ft.

WEST TEXAS WILDCAT FAILURES

Crockett County: Richfield Oil 1 Bean, Sec. 13, Blk. UV, GC&SF Sur., 6 mi. NE Todd pool, elev. 2,450 ft., Ellenburger 7,858 ft., Simpson 7,818 ft., dry, TD 8,806 ft.

Lynn County: D. D. Feldman 1-K C. O. Edwards, Sec. 313, Blk. 3, EL&RR Sur., 3 mi. NW Tahoka, elev. 3,178 ft., dry in Clear Fork, TD 7,503 ft.

Ward County: Standard of Texas 1-K Durgin, Sec. 15, Blk. 34, H&TC Sur., deep test in South Ward field, elev. 2,568 ft., San Angelo 4,540 ft., Wolfcamp 6,037 ft., Mississippian 9,272 ft., dry, TD 10,008 ft.

SOUTHEASTERN NEW MEXICO

HOBBS.—Mid-Continent Petroleum Corp. 1 Christmas, west offset to Gulf Oil Corp. 1 Paddock, Holt strike in the Drinkard area of Lea County, ran a 30-minute drill-stem test from 5,081-5,165 ft., showed gas in 4 minutes and oil in 15 minutes. Oil flowed at the rate of 20 bbl. hourly. Humble Oil & Refining Co. 1 Penrose, wildcat on the south side of the Drinkard pool, cored from 5,134-54 ft. and recovered 11 ft. of lime showing oil and small porosity. A 90-minute drill-stem test from 5,191-5,292 ft. recovered 90 ft. of drilling mud and 270 ft. of oil and gas-cut mud. Operator is drilling ahead. Skelly Oil Co. 2 Johnson, discovery from the lower Grayburg south of the Penrose-Deep field, drilled plugs from 7-in. casing cemented at 3,582 ft. with total depth of 3,676 ft. The well flowed 216 bbl. of 35.5° gravity oil in 8 hours. Gas was estimated at 450,000 cu. ft. daily. Preparations were being made for natural completion.

Two new wildcats have been staked in Chaves County by E. J. McCurdy of Fort Worth, Tex. McCurdy 1 Ross, 2,310 ft. from the north and east lines of 35-12s-27e, is 12 miles east of Dexter. McCurdy 1 Pool, 980 ft. from the north line and 660 ft. from the west line of 21-11s-30e, is 40 miles east of Roswell and 15 miles northwest of the Caprock field.

This area reported three field completions this week—one each for Loco Hills, Red Lakes, and Grayburg-Jackson fields, all in Eddy County. The Premier field in Eddy County had two new field locations.

SOUTHEASTERN NEW MEXICO WILDCAT FAILURE

Lea County: Stanolind 1-L State, 17-18s-36e, 4½ mi. SE Vacuum field, elev. 3,845 ft., dry in San Andres, TD 5,522 ft.

MISSISSIPPI

Adams County Wildcat Has Oil and Gas Shows

JACKSON.—Charles H. Osmond 1 Armstrong-Ellisile, 31-5n-2w, is reported to have encountered oil and gas shows within the top 1,000 ft. of the Wilcox, which corresponds roughly to the zone of noncommercial oil shows in the Cranfield pool. Intermittent cores have been taken, and the well is coring now below 6,500 ft. The well is being drilled on the northwest flank of a large Gravity prospect, most of which lies in Wilkinson County.

Louis Roussel (formerly A. B. Irion) 3 Long-Bell Lumber Co., NW NW 14-2n-16e, in Clarke County, is trying to squeeze off salt water. In perforations at 3,755-73 ft. and 3,844-62 ft., operators swabbed heavy black oil and salt water. Pumping tests produced salt water with a show of oil. Two squeeze jobs have not helped. Testing is continuing.

MISSISSIPPI WILDCAT FAILURES

Covington County: Cities Service 1 Aultman, NE NE NW 22-7n-16w, dry, TD 9,700 ft., Massive sand 9,497 ft.

Jones County: Gulf Refining 1 Gambrell, 634 ft. north and 1,832 ft. west of SE corner of NE 34-10n-14w, dry, TD 9,033 ft., Comanche 9,020 ft.

Yazoo County: Atlas Oil and Refining 1 Jones-Dixon unit, 660 ft. north and 657 ft. east of SW corner of SE 21-12n-

Tube Borium Keeps 'em digging

STOODY TUBE BORIUM* KEEPS DITCHER TEETH SHARP ...ELIMINATES FREQUENT SHUT-DOWNS FOR TOOTH CHANGES...CUTS REPLACEMENT COSTS UP TO 75%

The two ditcher teeth pictured above were used on the same machine and operated under identical conditions.

The unprotected tooth at the top had to be sharpened every three days and was too short for further service after six sharpenings.

But the Borium-protected tooth at the bottom operated for 40 days and were only ½". It was simply resharpened in the forge, retipped with Tube Borium, and put back on the ditcher for another 40 days' service.

Before the tooth was finally worn out, it had operated a total of 120 days!

Tube Borium makes such savings possible because the deposits represent the ultimate in wear resistance and the ability to cut hard earth formations.

*Stoody Tube Borium is supplied in rods of 1/8", 5/32", 1/4" and 3/8" diameters and is available for either oxyacetylene or D.C. electric application. Prices and specifications are yours for the asking.

These tungsten carbide particles do not melt when tube is applied but are held in suspension in a mild steel matrix forming a deposit resembling coarse sandpaper.

Send for free booklet on TUBE BORIUM, showing sizes and styles of rods and recommended methods of application.

STOODY COMPANY

1138 West Slauson Ave., Whittier, Calif.

STOODY HARD-FACING ALLOYS
Stop wear... Eliminate Repair

The $45.15 check that earned $1,059

When time means money, Air Express *earns* its weight in gold as thousands of companies, large and small, have learned.

For instance, a Midwest manufacturer must retool almost in a matter of hours or lose a contract for a new radio part. So he wires Connecticut for new tools via Air Express and has them in the morning. He pays $45.15 Air Express charges, but makes over one thousand dollars on the contract he saves.

Specify Air Express-High Speed for Low Cost

To prevent tie-ups or shutdowns, save man-hours, gain production time, serve customers — these are some of the reasons why you will find the speed of Air Express economically important to your business.

Shipments travel at a speed of three miles a minute between principal U. S. towns and cities, with cost including special pick-up and delivery. Same-day delivery between many airport towns and cities. Rapid air-rail service to 23,000 off-airline points in the United States. Direct service to scores of foreign countries.

AIR MILES	2 lbs.	5 lbs.	10 lbs.	25 lbs.
250	$1.04	$1.25	$1.87	$2.63
500	$1.11	$1.52	$2.19	$4.38
1000	$1.26	$2.19	$3.74	$9.73
2500	$1.68	$4.20	$8.40	$21.00

AIR EXPRESS

AIR EXPRESS GETS THERE FIRST

Write Today for interesting "Map of Postwar Town" picturing advantages of Air Express to community, business and industry. Air Express Division, Railway Express Agency, 230 Park Avenue, New York 17. Or ask for it at any Airline or Express office.

Phone AIR EXPRESS DIVISION, RAILWAY EXPRESS AGENCY
Representing the AIRLINES of the United States

3e, dry, TD 5,297 ft., Wilburn sand 5,218 ft.

Rankin County: Atlas Oil and Refining 1 Burnham, SE SE SE NE 24-3n-5e, dry, TD 8,166 ft., Comanche 8,051 ft.

FLORIDA WILDCAT FAILURE

Gulf County: Pure 1 St. Joe Paper Co., 530 ft. north and 500 ft. east of SW corner 10-7s-9w, dry, TD 5,796 ft.

ROCKY MOUNTAIN

Second Well Fails to Equal Discovery's Record

DENVER.—Consolidated Gas Co. 2 Barkulo, SE NE SE 15-35n-4w, ⅛ mile east of same company's 1 Barkulo, which opened a new pool 2 miles west of nearest production in the Kevin-Sunburst field last May, so far has failed to come up to the record made by the discovery. It is shut down at 2,330 ft., with 350 ft. of fluid, mostly oil, in the hole. It had the top of the Ellis at 2,157 ft. and ran 22 ft. lower on structure than the discovery. The first well started off at 15 bbl. an hour, and after considerable testing made 120 bbl. of oil and 130 bbl. of water per day. The second well is not yet a completion.

East May Valley.—Union Oil Co. of California and Richfield Oil Co. 1 Kroell, SE NW NW 27-21s-46w, East May Valley district, Prowers County, Colorado, which is preparing to cut off and pull the 5½-in. to go to the Arbuckle after testing the Kansas City lime, had the following tops: Greenhorn, 200; Dakota, 448; Morrison, 784; Permian, 1,110; Blaine, 1,470; salt, 1,600; base of salt, 2,375; top Stone Corral anhydrite, 1,960; base of Foraker, 2,870; top of Pennsylvania, 3,060 ft.

Completions.—There were seven completions reported for the week, which with one exception, where in Montana, Kevin-Sunburst accounting for three, Elk Basin two, and Cut Bank one. Cole Creek had the only completion for Wyoming. There were no wildcat completions.

New locations.—Fifteen new locations were reported for the Rocky Mountain area. Of these, three were in Colorado, two in the Rangely field, and one on the Great Divide structure, in Moffat County. Wyoming had seven, scattered one each for Grass Creek, Winkelman, Steamboat Butte, Oregon Basin and Lance Creek, and two in the Garland field. Montana had five, of which three were in Kevin-Sunburst and the other two were wildcats in Liberty County.

CALIFORNIA

La Habra Hills Completion Regarded as Discovery

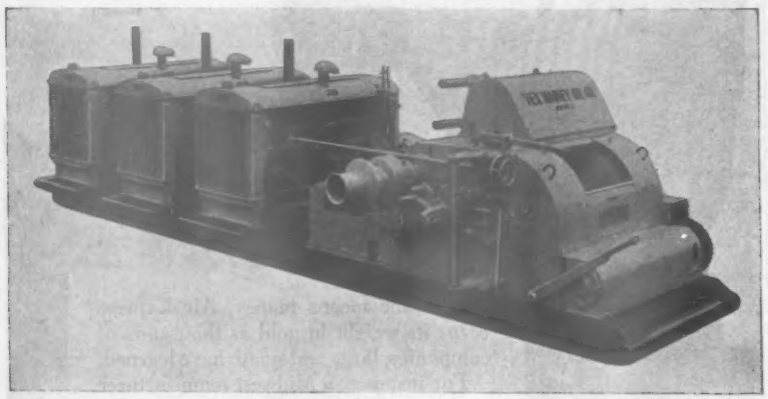
LOS ANGELES.—Union Oil Co. has announced that it regards its latest completion in the La Habra Hills section of Los Angeles Basin as a new discovery but that its importance remains to be determined. The discovery well is 15 Sansinena, located on property owned by the company for many years and on which the company has drilled a number of previous failures. It was listed as a completion in a proved field late in May as Union had completed a small pumping well on the property a number of years ago but subsequent work has changed the aspect of the situation and the well has since shown an increase in production. It is now pumping 126 bbl. of clean 22.8° gravity oil daily from 3,595 ft., with the producing interval at 3,346-3,595 ft.

The most interesting feature in connection with this completion is that there is some promising oil sand behind the C.P. point at 3,346 ft. and the last core taken on bottom showed surprising porosities and permeabilities. The company was content to take a pumping well but has since started a new test 1½ miles southeast of the discovery well. The structure is a fault trap and the producing interval is believed to be the Puente of middle Miocene age. The new field will undoubtedly be designated as the Sansinena.

Excellent progress is being made on the plan to unify production operations at Rio Bravo and this program may become operative within 60 days. A similar program involving the Greeley field has been under discussion for some time and will no doubt be consummated at an early date.

Completions during the week were scattered over several fields and new locations were likewise not concentrated. In the San Joaquin Valley, four small wells were completed at Elk Hills and three each at South Belridge and Buena Vista Hills. The last-named field is at present the most active and five new locations were made during the current period. In Los Angeles Basin, four completions and three locations placed the Wilmington field at the top of the list and in the Coastal district the Ventura-Newhall group of fields chalked up three completions and three new locations. Santa Maria Valley was off with two completions and two new locations. Nine new wildcat and semi-wildcat locations indicate a continuance of exploratory work although projected wildcats many times must wait for equipment.

The Newport-Costa Mesa district showed its first gas blowout this week when 1 Meyers of Barnhart-Morrow Oil Co. blew in doing about 5,000,000 cu. ft. daily from a sand around 800 ft. The hole had been



Three Model ME-66 Murphy Diesel Engines, each rated at 150 HP continuous, 180 HP intermittent, at 1200 RPM, make a compact power plant of this portable drill rig.

THREE MURPHY DIESELS GIVE TEX HARVEY OIL COMPANY'S DRILL RIG 450 CONTINUOUS HP

TEAMED up to provide 450 continuous HP, 540 intermittent HP, these three Murphy Diesel engines are performing with dependability and economy on this portable drill rig for Tex Harvey Oil Company.

Year after year, Murphy Diesels continue to prove their outstanding value, as stationary and portable power plants, in oil field service, where rugged construction, compactness and relatively light weight, along with highest standards of reliability for heavy duty power are demanded.

Easy to start, economical to operate and maintain, Murphy Diesels are making good on the toughest of oil field jobs . . . living up to their reputation for more power, more profit. Write for bulletin.

MURPHY DIESEL CO.
5305 West Burnham Street
Milwaukee 14, Wisconsin
TULSA BRANCH:
416 South Detroit Avenue, Tulsa 3, Okla.

208A

carried ahead to 1,160 ft. when the mud thinned and the well began to blow. The gas is dry and, while not a large blow as far as volume is concerned, cratering action complicated control work. All completions to date in this field have been pumpers but the complex, faulted structural condition of the area is not yet fully understood and consequently future drilling may result in flowing wells in some other fault block. Most wells to date follow a trend somewhat parallel with the coast line indicating a conservative exploratory program.

CALIFORNIA WILDCAT FAILURES

Kern County, Edison: Richfield 1 Lawson-Bennett, 26-30s-29e, bottomed in basement schist, Santa Margarita Miocene, 3,048 ft., Walker sand 3,133 ft., top schist 3,486 ft., TD 3,497 ft.

Round Mountain: Miller, York & Claire 1 Kofford, 24-28s-28e, bottomed in barren gray sand, Olcese 2,142 ft., Pyramid Hills sand 2,176 ft., Vedder 2,276 ft., TD 2,325 ft.

Wheeler Ridge: Richfield 1 Wildflower, 12-10n-20w, bottomed in hard gray shale, Santa Margarita Miocene 3,814 ft., no important showings, TD 5,019 ft.

Los Angeles County, Rosecrans: General Exploration Co. 1 Johnson, 11-3s-14w, bottomed in hard gray sand, swabbed small amount of oil, not commercial, TD 9,313 ft.

OKLAHOMA

Edge Wells Yield Richly in Southern, Central Pools

PHILLIPS PETROLEUM CO. found Bromide sand production on the north side of the Aylesworth pool in Marshall County, Oklahoma. The company's 1 Redman, NE NE NE 24-6s-6e, found first, second and third Bromide at 3,068 ft., 3,218 ft., and 3,333 ft., total depth 3,428 ft. The well flowed 400 bbl. in 11 hours, and later flowed 502 bbl. in 6 hours. The sand was shot from 3,386 to the bottom.

Sinclair Prairie Oil Co. 1 McDonald, NE cor. 34-10n-3w, a southwest edge well in the South Moore pool, in Cleveland County, had Burgess sand at 7,804 ft., total depth 7,900 ft. Casing was perforated at 7,850-68 ft. and 7,800-40 ft., and the well flowed 70 bbl. per hour.

Mid States Oil Co. 1 Mann, SW NW SW 16-3n-2e, East Pauls Valley pool, in Garvin County, flowed 444 bbl. in 12 hours through ½-in. choke. Brundedge conglomerate was found at 2,958-82 ft., total depth 3,281 ft. Production was through perforations throughout the formation. It is an east edge well.

The Texas Co. 1 Shore Community, C NW NE 35-17n-4w, a wildcat east of the Crescent pool in Logan County, had dry Layton sand at 4,877-99 ft., total depth 4,950 ft., and was given up.

Ace Gutowsky 1 Crum, NW NW SE 24-13n-3w, 3½ miles northeast of the Britton pool in Oklahoma County, found salt water in Wilcox sand at 6,910-49 ft., the total depth, and plugged back to 5,750 ft. to test the Cleveland sand at 5,689-5,710 ft.

The Texas Co. 1 Arundel, C SE NE SW 2-15n-1w, 7 miles northeast of the Arcadia pool in Oklahoma County, found Bartlesville sand at 5,238 ft. A 1-hour drill-stem test of the formation at 5,240-55 ft. developed 30 ft. of live oil and 30 ft. of mud, with no water. Drilling was resumed, total depth 5,265 ft.

Oklahoma's largest current producer of oil, the West Edmond field, in Oklahoma, Kingfisher, Canadian and Logan counties, had 560 wells producing from Hunton lime at the close of last week, together with 12 Bartlesville sand oil wells and 1 gas well. The field was producing about 71,150 bbl. per day. Sixty-three wells were rigged up, drilling or waiting to test.

OKLAHOMA SUCCESSFUL WILDCATS

Garvin County: New oil pool—Cities Service 1 Abernathy, SE SW SE 13-3n-2w, flowed 150 bbl. from first Bromide at 5,495-5,502 ft., TD 5,502 ft., gravity of oil 43.1°, Viola 5,132 ft., Bromide dense 5,259 ft., Bromide sand 5,495 ft.

Osage County: New oil pool—Wilcox 1, SW SE NW 15-22n-8e, flowed 275 bbl. from sand at 2,531-50 ft., TD 2,550 ft., Prue 2,128 ft., Verdigris 2,157 ft., sand 2,532 ft., May 2,548 ft.

Payne County: New oil pool—Northern Ordnance 1 Dewitt, NE SE SW 34-20n-4e, pumped 35 bbl. from Bartlesville 3,569-75 ft., TD 4,006 ft., Bartlesville 3,570 ft., May 3,837 ft., Woodford 3,956 ft., Misener 3,977 ft., gravity of oil 33°.

OKLAHOMA WILDCAT FAILURES

Bryan County: Tom Owens et al 1 Hawk, SE SE SE 25-7s-11e, dry, TD 2,784 ft.

Hughes County: J. E. Pitts 1 Meadors, NE NE SW 34-9n-10e, dry, TD 3,225 ft., Cromwell 3,110 ft.

Kay County: Prunty Production 1 Hagemeyer, NW NW NE 28-28n-3e, dry, TD 3,288 ft., May 3,262 ft.

Lincoln County: Fred Morgan 1 Yonts, NW SE SW 8-15n-4e, dry, TD 3,987 ft., Prue 3,936 ft.

Pottawatomie County: Stanolind 1 Teas, NE SE NW 9-9n-4e, dry, TD 4,830 ft., second Wilcox 4,805 ft.

KANSAS

Sedgwick County Strike Is Possible New Pool

HELMERICH & PAYNE, INC., may be giving Sedgwick County a new pool in their 1 Rausch, SE SE SW 14-27-3w, north of Goddard. The Simpson dolomite was cut at 4,141 ft., and the well was running 34 ft. high. Saturation was found to 4,155 ft., and a core was taken at 4,155-65 ft., with a recovery of 6 ft. A good show was noted in the cuttings. Operators are running 7-in. casing.

Barton County: Black-Marshall 1 Willcutt, NW SE SW 2-19-15w, wildcat, pumped 4 bbl. of oil per hour on a 5-hour test, with no water or gas. The Arbuckle was cut at 3,604 ft., and the Reagan at 3,613 ft. Pipe was set at 3,607 ft., and when the plug was drilled, the hole filled with 1,400 ft. of oil. Operators will continue to test.

W. L. Hartman 1 Harris, NE SE NW 31-19-12w, two and one-half miles east of Great Bend, has set pipe at the top of the Arbuckle, where a good show of oil was reported. The Lansing was called at 3,156 ft., Conglomerate at 3,379 ft., and Arbuckle at 3,398 ft.

Sedgwick County.—Fuller & Turner 1 Hohn, NW NW SW 22-27-1w, wildcat, is building tanks in order to test. Kansas City was topped at 2,817 ft., and drilled to a total depth of 2,827 ft. Operators reported a 1,000-ft. oil fillup in 4 hours, and after the swab was run once, the hole filled almost to the top.

Sumner County.—Carter Oil Co. 1 Latimer, NW NE 12-33-2w, discovery well, was assigned a potential of 157 bbl. of oil per day from the Simpson sand, perforations 4,260-65 ft. Nearest production is in the Wellington pool, 7 miles to the northeast.

KANSAS WILDCAT FAILURES

Barton County: Royer Farris 1 Meyer, NW NE SE 32-20-11w, dry, TD 3,473 ft., Arbuckle 3,463 ft.

Butler County: Skelly 1 Starkey, SE SE NE 33-28-7e, dry, TD 2,859 ft., Mississippi lime 2,820 ft.

Kingman County: Vickers 1 Carrick, SW SW NW 28-30-8w, dry, TD 4,853 ft., Arbuckle 4,816 ft.

B & R and Gore 1 Carter, NE NE NE 1-30-10w, dry, TD 4,698 ft., Arbuckle 4,648 ft.

Phillips County: Texas 1 Mai, NE NW NE 26-5-19w, dry, TD 3,650 ft., Arbuckle 3,616 ft.

Reno County: Hershfield & Co. 1 Duepser, NE NE NW 7-24-7w, dry, TD 4,185 ft., Arbuckle 4,151 ft.

Sumner County: John Winters 1 Butterworth, W½ NW NE 31-32-2e, dry, TD 3,775 ft., Simpson 3,733 ft.

Trego County: Continental 1 33 Strat (D. K. North), SE SE NW 23-15-21w, dry, TD 4,150 ft.

FOREST CITY BASIN

ST. JOSEPH, Mo.—Thomas 1 Dollies in NW NE NW 28-36n-33w, Vernon County, Missouri, near Richards, was drilling a 46-in. hole for a shaft to mine oil. Several shallow pumpers are on the lease with pump jacks still in place, but have not been pumped for several years.

Vollrath 1 fee, in SW SE SW 2-51n-34w, Platte County, Missouri, had 149,000 cu. ft. of gas at total depth of 545 ft.

Benson et al 1 John Winters estate in C EL NW NW 23-10s-23e, Wyandotte County, Kansas, was a dry hole, having base of Hertha lime at 330 ft., top of Mississippi lime at 1,073 ft. with a hole full of water, and a little oil stain at 1,188-1,192 ft. Total depth was 1,200 ft.

CANADIAN FIELDS

Steveville-Princess Well Flowing 80-100 Bbl.

CHATHAM.—In the Steveville-Princess field, eastern Alberta, Peerless Oils 1, LSD 4, 18-20-11w4, finished in the Sunburst at 3,184 ft. with oil rise of 560 ft. and about 25,000 cu. ft. gas. While lowering tubing the well shot mud and oil into the derrick and is flowing 80 to 100 bbl. through 5/32-in. choke. A gas strike just above the Sunburst was cemented off. Sunburst production is 27° gravity.

Conrad.—In the Conrad field, southern Alberta, Mid-Continent East Crest 5, LSD 2, 8-6-15w4, deepened to 3,167 ft. has 30 bbl.-initial production. Conrad-Province 51-5-A, LSD 3, 5-6-15w4, finished at 3,011 ft., is on the pump, with initial production unreported. Conrad-Province 37-5-A, LSD 15, 5-6-15w4, finished at 3,123½ ft., is installing pump.

Turner Valley.—Retesting of shallow crude possibilities in Miracle Oils 3, LSD 11, 4-19-2w5, a former gas-cap naphtha producer in South Turner Valley, has developed 25 bbl. a day light crude production from the Home sand after a first shot just below the bottom of that horizon. Previous tests of the Dalhousie sand, between the Home sand and the Madison limestone, showed only noncommercial crude. Further shots will be made in the Home sand, to be followed by acidization. If good results are secured, systematic development of light crude horizons above the Madison limestone will be undertaken in other Turner Valley producers.

New Valley.—East of North Turner Valley extension, Royalite-New Valley 1, LSD 2, 22-21-3w5, bottoming at 10,259 ft., got water in the Madison limestone, and has been abandoned.

Saskatchewan.—In the Vera-Unity area of western Saskatchewan Bata Petroleums 4, LSD 14, 24-39-23w3, finished at 1,659 ft., had initial flow of 3,500,000 cu. ft. on drill-stem test with settled production estimated at 1,000,000 cu. ft. Bata Petroleums 5, LSD 4, 25-39-23w3, was dry at 2,362 ft.

PENBERTHY
"REFLEX"
WATER GAGE SET

For oil field, locomotive type and marine boilers. Water shows black — steam shows white; the water level is unmistakable. U-Bolt construction is strongest and simplest to service. Glass replaced by simply removing nuts on face of gage . . . unnecessary to work between gage and boiler. Conforms with A.S.M.E., Federal and State requirements when used for pressures specified by their respective codes.

This is one of the complete line of Penberthy gages that meet every liquid level gage requirement.

PENBERTHY INJECTOR CO.
DETROIT, MICH. Canadian Plant WINDSOR, ONTARIO

WORTH WAITING FOR BUT NO WAITING IS NECESSARY

'BESTOLIFE—the Lead Seal Joint Compound used successfully in the Drilling and Refining Industries for years—is immediately available through more than 100 distributors in the U.S.A. Any priority rating will do.

Your nearest supply house field store probably has 'BESTOLIFE in stock for immediate delivery. Use 'BESTOLIFE—it's BETTER!

EXPORT: THE NATIONAL SUPPLY CORP., 30 ROCKEFELLER PLAZA, NEW YORK

I. H. GRANCELL
1601 EAST NADEAU STREET
LOS ANGELES 1, CALIFORNIA

Among the

Drilling Contractors

L. D. Cain Drilling Co. is the new name of Southern Drilling & Well Service Co., Houston. The change is announced as of July 1.

Seth Herndon has the drilling contract on the Darby & Bothwell, Inc. 1 Faulkner, in SW SW SW 11-22-26w, Hodgeman County, Kansas. Location is approximately 22 miles south of the Arnold pool production in Ness County. It will be an Arbuckle test to approximately 5,100 ft.

National Drilling Co. has been organized at Seminole, Okla., by Frank W. Tillack and associates, J. L. White, F. G. Sarber, and W. J. Albright. The firm has purchased a new rig capable of drilling to 7,000 ft.

Arrow Drilling Co. and Keener Oil & Gas Co. have made location for 1 Chapmen, in NW NW SE 5-12n-7e, a projected Cromwell sand test, approximately a mile north of production in the Paden pool in Okfuskee County, Oklahoma. Drilling is expected to start July 1.

Drilling & Exploration Co. is preparing to drill another well for Ralph Lloyd in the Ventura Avenue field of California, and K. L. Kellogg has the contract to drill another well for Tide Water Associated Oil Co. on the V. L. & W. lease in the same field. Both tests will be completed at or below 10,000 ft.

Hissom Drilling Co. has the drilling contract on the Stanolind Oil & Gas Co. and Skelly Oil Co. 1 Benson, in NW NE NW 30-23-15w, Pawnee County, Kansas. The test is situated 3 miles south of Arbuckle production in the Zook pool and 3 miles northwest of Lansing production in the Macksville pool.

Lupher Drilling Co. has been awarded contract to drill the Pure Oil Co. 1 W. R. Carney, in C S½ NW NE 7-13n-11w, Newaygo County, Michigan.

H. A. Herschfield has the drilling contract on the A. R. Jones 1 Wahlberg, in SE SE SE 23-15-22w, Trego County, Kansas. Closest production is the Penny Wann pool of Ellis County. Jones is associated with Inland Oil Co.

Gordon Oil Co. is contractor on the Michigan Consolidated Gas Co. 1 Pearl Sutherland et al, in C NE 7-13n-11w, Newaygo County, Michigan.

Stearns Drilling Co. and **Vernon Oil & Gas Co.** have staked location at 1 Froelich, in NE NE NE 3-13-16w, Ellis County, Kansas. The test is located 1 mile northeast of Emmeran pool production. It will be drilled with cable tools.

NEW!!
"MITT-GRIP"
COLLAR
...for Wells' Stubby
ELECTRODE HOLDER

- Makes rod-changing *easier* and *quicker*, because it provides a positive, convenient grip on the insulator.
- Holds small rods upright and away from work.

See your local distributor.

"More Arc Time"
Martin Wells
ELECTRODE HOLDERS
Los Angeles 1, California
MODEL 3H
300 Amp.

UNIBOLT
"BIG INCH"
COUPLINGS
Are more widely used on pump suctions than any other connection. There must be a reason!

UNIBOLT
THE ONE BOLT COUPLING

THORNHILL-CRAVER COMPANY—HOUSTON

"Best Bet Yet"

These oil-proof, wear-resistant, plastic tubing protectors are an integral part of the tubing collar. Made in all sizes, they prevent the metal-to-metal contact that has caused many expensive "wet" jobs in pumping wells in the past.

PATTERSON-BALLAGH
TUBING PROTECTORS
LOS ANGELES 1 • HOUSTON 10 • NEW YORK 6

MARKET QUOTATIONS

Prices as of June 26, 1945

(This service is abbreviated because most refinery products are selling at the Government's price ceilings. Quotations on other products than those shown here furnished on request. Quotations are f.o.b. plant in tank cars and in cents per gallon.)

REFINERY GASOLINE

	76†	70-74
Mid-Continent*	6.75	5.875
Gulf Coast	6.75	5.825
Northeast Coast	...	9.075
California	...	6.50-7.00

*Basic Oklahoma Group 3. †1939 C.F.R. (research method).

NATURAL GASOLINE

Grades:	26-70	18-35
Oklahoma (Group 3)	4.500	5.400
North Texas (f.o.b. plant)	4.125	4.950
North Louisiana (f.o.b. plant)	4.375	5.250
California	4.875	5.500

CRUDE-OIL PRICES

Representative posted schedules per bbl.	
East Texas	$1.25
Conroe	1.49
Tepetate, Louisiana	1.18
Illinois Basin	1.37
Pecos County, Texas	.95
Bradford, Pennsylvania	3.00
Van, Van Zandt County, Texas	1.09

Note: Exclusive of subsidy.

GRAVITY SCHEDULES

Top prices include all gravities above grades designated, and low prices include all gravities below grades designated:

Gravity—	Signal Hill, Calif.	Okla-homa Kansas	Gulf Coast Texas	West Tex.*
18-18.9	$0.80	....	....	....
19-19.9	.84	....	$1.06	$0.70
20-20.9	.88	$0.85	1.09	.72
21-21.9	.92	.87	1.10	.74
22-22.9	.96	.89	1.12	.76
23-23.9	1.00	.91	1.14	.78
24-24.9	1.03	.93	1.16	.80
25-25.9	1.07	.95	1.18	.82
26-26.9	1.11	.97	1.20	.84
27-27.9	1.15	.99	1.22	.86
28-28.9	1.19	1.01	1.24	.88
29-29.9	1.23	1.03	1.26	.90
30-30.9	1.23	1.05	1.28	.92
31-31.9	....	1.07	1.30	.94
32-32.9	....	1.09	1.32	.96
33-33.9	....	1.11	1.34	.98
34-34.9	....	1.13	1.36	1.00
35-35.9	....	1.15	1.38	1.02
36-36.9	....	1.17	1.40	1.04
37-37.9	....	1.19	1.42	1.06
38-38.9	....	1.21	1.44	1.08
39-39.9	....	1.23	1.46	1.10
40 and above	....	1.25	1.48	1.12

*Includes Lea County, New Mexico.

A.P.I. REFINERY REPORT

Week ended June 16, 1945
(Figures in thousands of barrels)

	Dly. crude runs to stills	Stocks: Gaso-line	Dis-tillate	Resid-ual
East Coast	735	13,358	6,928	5,966
Appalachian	159	4,311	528	322
Ill., Ind., Ky.	719	20,136	4,029	2,170
Okla., Kan., Mo.	395	9,495	1,569	1,198
Inland Texas	236	2,914	485	902
Tex. Gulf Coast	1,190	14,343	4,960	5,362
La. Gulf Coast	271	4,438	1,685	1,103
North La., Ark.	84	1,915	1,455	191
Rocky Mt.	139	2,471	322	595
California	987	14,116	8,356	21,673
Total 6-16-45	4,915	*87,504	30,387	39,482
Total 6- 9-45	4,827	87,896	30,339	38,996
Total 6-17-44	4,741	84,325	34,079	32,668

*Military 41,134; Civilian 46,370.

CRUDE-OIL STOCKS

(Bureau of Mines Estimate)

Week ended:	Bbl. of crude*
June 16, 1945	221,922,000
June 9, 1945	221,552,000
June 17, 1944	230,565,000

*Excludes unrefinable California stocks.

ALTEN
Steel Welded
LOUISIANA
CASING HEADS

ONE OF OVER 300 ALTEN OIL FIELD PRODUCTS

Fig. A-132, Threadless

Fig. A-133, Threaded

See Composite Catalog for complete list or write us for catalog.

ALTEN'S
FOUNDRY and MACHINE WORKS
Established 1889 . . . . . Lancaster, Ohio
EXPORT OFFICE: 342 Madison Ave., New York 17, New York
TEXAS OFFICE: 45 San Jacinto St., Houston 1, Texas
Leading Supply Stores Carry All Alten Oil Field Equipment

DRIVING TORQUE CUSHIONED WITH

BJ
KELLY BUSHING

Bushing Body is a solid, one piece unit with a corrugated inner core. An oil resistant synthetic rubber cushion absorbs the shock of drilling torque. Bushing is equipped with four slips inside the rubber cushion, faced with liners made of anti-friction material. These liners take all the wear and are reversible for long economical life. Ask the BJ man or see your supplier.

BYRON JACKSON CO.
Houston • LOS ANGELES • New York

STRAIGHTEN THAT HOLE

WITH A ZUBLIN SIMPLEX BIT

EIGHT interchangeable cutters of heat treated and hard surfaced steel. For drilling through cement, collapsed casings and variable formations and straight holes.

See Composite Catalog or Bulletin and information upon request.

UNIVERSAL ENGINEERING CO.
OFFICE AND FACTORY
2369 EAST 51st ST. • LOS ANGELES 11, CALIFORNIA
BRANCHES HOUSTON, TEXAS • LAKE CHARLES, LA.
BAKERSFIELD, VENTURA AND AVENAL, CALIFORNIA

PERSONALS

Sam Harlan Elected Vice President of Cities Service

SAM HARLAN, whose election to a vice presidency of Cities Service Oil Co. (Del.) was announced last week, joined the company in July 1924 as a junior engineer and since 1941 has been assistant executive and member of the board of directors. Harlan, a native Texan, had just received his B.S. degree in chemical engineering from Texas A. & M. College when he entered employment with the company by enrolling in its junior engineering course. On its completion he was permanently assigned to the oil-production division in May 1925.

In October 1929 Harlan was appointed engineer in the Bartlesville office of the oil-production division and in August 1939 was named assistant manager of production. On August 1, 1941, at the time of the Indian Territory Illuminating Oil Co. merger, he was made assistant executive and in September of that year was elected a member of the board. In his new post as vice president he takes the place of J. M. Nisbet, who resigned and moved from New York to California, where he has business interests.

Henry D. Moyle, Salt Lake City, was elected president of Inland Empire Refineries, Inc., at a recent meeting of the directors. **K. W. Yeats,** Salt Lake City, was made vice president.

Glenn H. McCarthy, independent oil operator of Houston and one of the developers of the Anahuac field, has acquired a 15-acre site in that city on which he plans to construct a community center costing $16,000,000. He has applied for priorities on an 18-story building, three 12-story buildings, and two 10-story buildings — all apartment hotels, with commercial sections — along with smaller buildings for stores, a bank, skating-rink, swimming-pool, etc.

Clint Malloy, formerly scout at Shreveport for The California Co., has been transferred to the company's land department in New Orleans. **Porter Savage** succeeds him at Shreveport.

J. S. Abercrombie, independent oil operator of Houston, recently staged a horse show at Pin Oak Stables for the benefit of the Houston Holidays fund. The show, which evoked wide interest, added more than $17,000 to the fund.

E. L. Smith, California Star Oil Co., has been elected chairman of District 9, Conservation Committee of California Oil Producers.

Milton S. Beringer last week was appointed general manager of refinery operations for British American Oil Co., Ltd., Toronto, succeeding **L. E. Wooley,** who retired owing to ill health.

Lt. Col. Whitney Stone, son of one of the founders, has been elected president of Stone & Webster, Inc., Boston, among the nation's largest engineering firms and active in design and construction of numerous processing facilities in the oil industry.

Frank A. Stivers, vice president of The Texas-Empire Pipe Line Co., has been named president of the Tulsa Board of Education.

Joseph Ward, geologist at San Antonio for Mid-Continent Petroleum Corp., has been moved to Shreveport as district geologist.

Ward Perrott, president of Louisville Gas & Electric Co., has been elected president of Equitable Gas Co. and Pittsburgh & West Virginia Gas Co. All three companies are affiliates of the Standard Gas & Electric system. Perrott succeeds **F. F. Schauer,** who retired June 1 after 25 years' service. Perrott, a graduate of Notre Dame University, joined the Standard Gas & Electric system in 1937. He was an infantry captain in the World War 1.

Quay D. Ellenberger, of Bellevue, a Pittsburgh suburb, and **David L. Evans,** of Bradford, Pa., have accepted assignments as field engineers with the Pennsylvania Grade Crude Oil Association's production research laboratory at Bradford.

E. H. Weaver, since April 1944 in charge of the San Francisco office of Union Oil Co. of California, has been made manager of purchases, with headquarters in Los Angeles. He succeeds **H. C. Farquhar.**

John P. Herrick, of Olean, N. Y., and Los Angeles, oil producer, historian, and newspaperman, was awarded the honorary degree of doctor of laws at commencement exercises of Alfred University. Entering the oil business in 1901, Herrick increased his holdings until his interests included fields in Wyoming, Texas, Kentucky, Oklahoma, and California. He is exploring the early annals of oil fields in New York preparatory to writing a history.

Robert Steel, back from the Army and an assignment on the Canol project, has opened an office as consulting geologist in Oklahoma City. Steel formerly was district geologist for Cities Service Oil Co. at Midland, Tex.

K. M. Watson, professor of chemical engineering at University of Wisconsin and former technologist with Universal Oil Products Co. and Gulf Oil Corp., is head of a project for study of butadiene looking toward improvements in design and operation of synthetic-rubber plants.

Dr. C. E. ZoBell, of Scripps Institution of Oceanography, was in Bradford, Pa., this week, conferring with oil men and aiding in a study of bacteria in connection with secondary-recovery operations in the Pennsylvania oil region. Dr. ZoBell, consultant to Pennsylvania Grade Crude Oil Association, is helping scientists at the association's Bradford laboratory in getting the new microbiological research under way.

Albert Gregersen of Los Angeles, for the past 2 years geologist for Petroleum Administration for War

1/16" OF STOODY 6 HERE TRIPLES EXHAUST VALVE LIFE!

Works as Well on Worn Valves as New Ones — Saves Money — Eliminates Shortage Worries

AN ounce or two of Stoody 6 welded to new or worn exhaust valve faces adds 300 to 400 percent to their normal life, prevents burning, saves overhaul jobs, costs only a few cents per valve.

This folder outlines the simple procedure any garage or shop equipped with acetylene welding equipment can follow. Eliminates your worries about valve replacements and saves money as well.

Write for folder "Weld New Life Onto Worn Valves With Stoody 6" — no obligation.

STOODY COMPANY
1138 SLAUSON AVE., WHITTIER, CALIF.

STOODY 6 · THE METAL THAT ADDS EXTRA MILES TO EXHAUST VALVE LIFE!

in District 5, has been engaged by Danish American Prospecting Co., a Gulf Oil Corp. subsidiary, to take charge of its exploration program on a concession in Denmark which was interrupted by the war. Gregersen will leave soon for Copenhagen to reopen the company offices and organize a drilling staff. A graduate of Stanford University, Gregersen was for many years on the geological staff of The Texas Co.'s California division. He is a former chairman of the Pacific Coast section American Association of Petroleum Geologists.

Dr. Robert R. Wheeler has resigned as chief geologist for Superior Oil Corp. of California in North Texas and Oklahoma, with headquarters in Oklahoma City, to become chief geologist for Eason Oil Co. in Enid, Okla. He is a Harvard graduate. Eason is said to be planning increased activity in Oklahoma oil and gas areas.

Judge A. M. Ebright, chief counsel for Cities Service Oil Co. (Del.), has been elected a member of the board of directors. Ebright received his legal training at the universities of Missouri and Kansas and was practicing law in Wichita when he joined Cities Service in 1937. He was formerly a district judge in Sedgwick County, Kansas.

J. R. Gillen, formerly in the production department of Atlantic Refining Co. at Seminole, Okla., has been transferred to scouting and is working out of Shawnee, Okla.

Dr. Robert E. Wilson, chairman and chief executive officer of Standard Oil Co. (Indiana), has been elected to the board of trustees of University of Chicago. Dr. Wilson is a graduate of College of Wooster and of Massachusetts Institute of Technology, of whose governing boards he is a member. He was a major in the Chemical Warfare Service in World War 1, and he served as chief petroleum consultant for the Government in the present war. More recently he has been chairman of the economics committee of Petroleum Industry War Council.

CALENDAR

July

Board of directors Rocky Mountain Oil and Gas Association, Townsend Hotel, Casper, Wyo., July 25.

October

American Association of Oil Well Drilling Contractors, Oklahoma City, October 1-2.

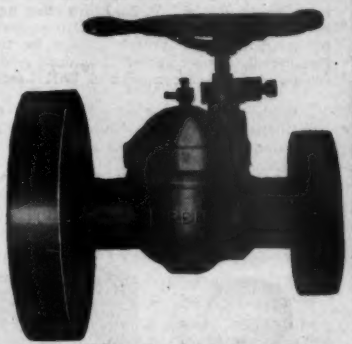
Texas Mid-Continent Oil and Gas Association, Rice Hotel, Houston, October 4-6.

I.P.A.A., annual membership meeting, Tulsa, October 15, 16 and 17.

ORBIT VALVES

MASTER VALVE WITH UNEQUAL FLANGES

The ORBIT GEAR OPERATED MASTER VALVE makes your Christmas Tree more compact by eliminating the use of an adapter flange—also eliminating chances for additional gasket leaks. The Unequal Flanges are cast integral with the body of the Valve.



Orbit Gear Operated Master Valve

This valve can be furnished thru all fabricators of Xmas Trees or thru any of your local supply stores at a price comparable to that of other leading valves, YET, this valve requires no lubrication to effect a seal.

See 1944 Composite Catalog

SERVICE REPRESENTATIVES
R. G. "Bob" Cole, Houston, Texas
Phone Fairfax 0057
Warehouse 407 Velasco Street
Houston
Earl F. Warren, Phone 910-W, Alice, Texas
Rex E. Galloup, Phone 6436, Lubbock, Texas

ORBIT VALVE COMPANY
TULSA, OKLAHOMA

T. F. P. KELLY

R. E. GROTE

F. L. ALEXANDER

Equipment Men in News

Thomas F. P. "Pat" Kelly has been appointed technical service engineer with Industrial Engineering Co., makers and applicators of Somastic. He will make his headquarters at the home office in Bartlesville, Okla.

Robert E. Grote, president of The Metal Goods Corp., announces the opening of a new metals warehouse in Tulsa. **Edwin H. Hilmer** is district manager in charge of activities in Oklahoma. **Ray S. Lough** and **George E. Bly** are sales representatives.

Completion of a new factory in Dallas, Tex., has been announced by Kelite Products, Inc., Los Angeles. Headquarters for the Southwestern division of Kelite are now being moved from Houston to Dallas. **F. L. Alexander** has been appointed assistant national director of Kelite, with supervision over this new plant as well as all regional offices in the Southwestern Division. **Roy South** is plant superintendent and office manager. **F. J. Oxspring** is plant foreman and **Earl Lester,** divisional manager.

With the resignation of **Fred L. Convers,** vice president of Continental Supply Co. in charge of exports, **R. M. Dinges** has been named as his successor. **Charles J. DeLay** has been named manager of the exports division. Convers joined the company in 1920, and after a period in New York City, with Emsco, returned to Continental Supply in charge of exports in 1929. Dinges joined the company in 1923, and his service includes a period spent in Venezuela. Delay has been with the company since 1919, and was transferred to the New York office in 1921. All three men are members of the New York chapter of Nomads.

R. M. DINGES

C. J. DELAY

F. L. CONVERS

Three officials of Timken Roller Bearing Co., headed by **William E. Umstattd,** president, left Canton June 15 for a flying business mission to Moscow. Accompanying Umstattd were **A. L. Bergstrom,** vice president in charge of engineering, and **O. J. Horger,** chief engineer of the railway division, all of whom are pictured below. The three men expect to remain in Russia for 10 to 12 days. On the return trip, Mr. Umstattd will stop off to inspect Timken plants in France and Great Britain.

Dr. O. S. Duffendack, director of research, for North American Philips Co., Inc., has been appointed vice president and director of research and engineering, and **E. J. Kelly,** at present manager of manufacturing, has been made vice president and general factory manager.

Wayne H. Schultz has returned to the staff of Hill, Hubbell & Co. division of General Paint Corp., Cleveland, Ohio, as field engineer and eastern representative after a leave of absence during the emergency.

Benjamin F. Fairless, president of United States Steel Corp. of Delaware, announced in Pittsburgh the resignation of **Avery C. Adams,** vice president—sales. At the same time he announced that **David F. Austin,** vice president in charge of sales of Carnegie-Illinois Steel Corp., had been appointed acting vice president —sales, of United States Steel Corp.

Harry H. Tinch has joined the sales staff of W-K-M Co., Inc., 220 Roberts Street, Houston, Tex., and will specialize in the sale of valves to the pipe line industry.

Los Angeles Nomads will hold their annual wing ding at the Riviera Country Club on July 27. Advance indications are that this will be the biggest affair of its kind ever staged by the local chapter.

McCord Corp., Detroit, Mich., has been awarded the sixth Army-Navy production award.

Le Roi Co., Milwaukee, Wis., announces the appointment of The Ingersoll Corp., Shreveport, La., as engine distributors in the southern counties of Arkansas, all of Mississippi and the upper two-thirds of Louisiana.

New Headquarters for Rector's Completed

Rector Well Equipment Co.'s Fort Worth, Tex., headquarters announces completion of a modern fireproof shop covering 15,000 sq. ft. of floor space on a 2½-acre site less than 2 miles from downtown Fort Worth. It is completely outfitted with the latest machine tools for head manufacture, and for assembling and testing complete christmas trees. A railroad spur line runs directly into the shop. Ample warehouse space is available for the housing and handling of large stocks. Manufacture of Rectorheads is continuing in the Wichita Falls plant where once all of the company's production was handled. Complete facilities for assembly and testing of christmas trees have also been installed at the Wichita Falls location and at the Rector plant in Houston.

New Rector plant at Fort Worth. Inset: View of a few of the production machines

Featuring Miss Jane Randolph, Motion Picture star, who is "Miss Mission" in Mission's series of color advertisements. Photograph by Robert Yarnall Richie

Welcome...

YOU have seen Miss Mission in the Inspection Department demonstrating Mission's exacting methods of inspection. This kind of inspection assures oil men getting Mission products that save time, money, and trouble on the lease.

You have seen Miss Mission talking with oil men on the derrick floor, men who have proved time and time again the outstanding advantages of Mission Products.

NOW Miss Mission invites you to visit the Mission plant in order that you may see first hand Mission's precision manufacturing controlled by Mission's system of rigid inspection.

You will see the results of
FREE COMPETITIVE ENTERPRISE
in MISSION PRODUCTS

Free enterprise makes for constant improvement. It rewards progressive manufacturers with increasing orders. Mission's invitation to competitive tests through the years and Mission's unusual guarantees are proof of Mission's belief in the principle of free enterprise for promoting progress by keeping manufacturers on their toes.

Mission
MANUFACTURING CO

"Tomorrow is *another* day"

Because, for almost a century, Powell Engineering has been anticipating the flow control requirements of products and processes still in the laboratory stage. Powell was ready to meet—and has met—every new demand imposed by war. Today we can justifiably say "there's a Powell Valve for every *known* requirement of industry."

But "tomorrow is another day" and it will bring new problems in flow control. Powell, as always, will be ready to solve them.

The Wm. Powell Co.

Dependable Valves Since 1846

Cincinnati 22, Ohio

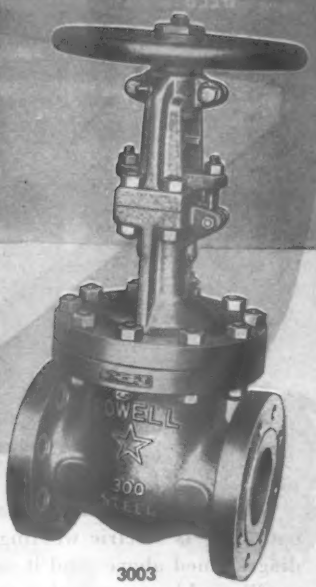
Fig. 1793—125-pound Iron Body Bronze Mounted Gate Valve with Flanged ends, outside screw rising stem, bolted flanged yoke, bronze seats, and taper wedge solid disc. Available with taper wedge double disc. Fig. 1444.

500

Fig. 500—125-pound Bronze Gate Valve, with screwed ends, inside screw rising stem, screwed bonnet and either taper wedge solid or double disc.

1375

Fig. 1375—200-pound Bronze Gate Valve, with screwed ends, inside screw rising stem, union bonnet and wear-resisting nickel bronze seat rings and disc.



3003

Fig. 3003—Class 300-pound Cast Steel Gate Valve, with flanged ends, outside screw rising stem, bolted flanged yoke and taper wedge solid disc.

POWELL VALVES

Why it pays to specify
REPUBLIC RUBBER HOSE and BELTING

All hats are off to the amazing achievements of the mechanical rubber and refining industries in the comparatively short time since the War Production Board requested conversion from crude to synthetic rubber.

We share the enthusiasm of countless careful buyers for the specific achievements of Republic Rubber. Republic Hose and Belting now incorporate such unusual oil-and-heat-resisting qualities and surplus strength for overloads and shocks, that what started out to be a war time handicap has come to be an industrial triumph.

To specify a Republic Hose or Belt is to gain an advantage not unlike that of compound interest over simple interest. The difference may seem unimportant, but time tells a different story.

REPUBLIC RUBBER YOUNGSTOWN-OHIO

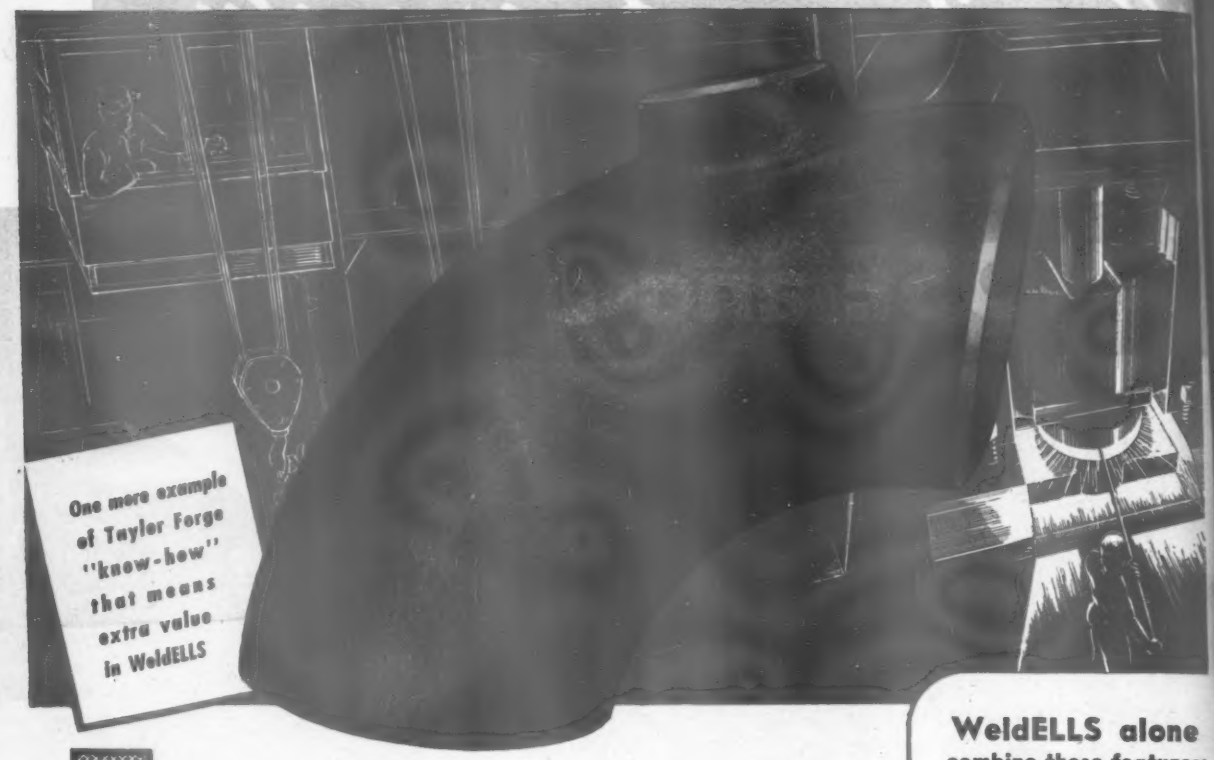
Leadership in Policy, Product and Performance

JONES & LAUGHLIN SUPPLY COMPANY

Subsidiary of Jones & Laughlin Steel Corporation

TULSA, OKLAHOMA

J&L STEEL



There's always another one for us!

★ *Just when we think we've seen everything in special forged fittings another tricky requirement turns up . . . and probably always will. This time it's an order for seven-inch carbon-moly WeldELLS with integrally formed 3-inch outlets in their back walls.*

We have solved problems that are a lot tougher than this, but none exactly like it. Thus, like hundreds before it, it has contributed its share to the sum total of Taylor Forge "know-how" . . . is one more proof that we have honestly earned our reputation for doing things with hot metal no one else does.

THE unduplicated experience of Taylor Forge in the field of special forging has a vital bearing on your choice of standard welding fittings. It means there is nothing to be desired in welding fittings that is not within the scope of the methods and facilities that have grown out of this experience.

By applying these methods and facilities we have given WeldELLS features that are not combined in any other fittings. A good example of this is the uniform strength achieved through proper distribution of extra metal where stresses are higher. Another, is the extreme dimensional accuracy attained by special truing operations. Still another is the special process which forms the tangents, and there are many more.

This specialized Taylor Forge knowledge is responsible for the features listed opposite—is the reason why those who are best qualified to know will agree that

WeldELLS alone combine these features:

- **Seamless** — greater strength and uniformity.
- **Tangents**—keep weld away from zone of highest stress—simplify lining up.
- **Precision quarter-marked ends**—simplify layout and help insure accuracy.
- **Selective reinforcement** — provides uniform strength.
- **Permanent and complete identification marking**—saves time and eliminates errors in shop and field.
- **Wall thickness never less than specification minimum**—assures full strength and long life.
- **Machine tool beveled ends**—provides best welding surface and accurate bevel and land.
- **The most complete line of Welding Fittings and Forged Steel Flanges in the World** — insures complete service and undivided responsibility.

WeldELLS have everything

TAYLOR FORGE & PIPE WORKS, General Offices & Works: Chicago, P.O. Box 485
New York Office: 50 Church Street • Philadelphia Office: Broad Street Station Bldg.

Quality

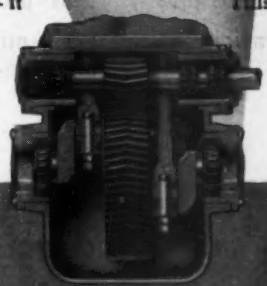
UNDER THE MAGNIFYING GLASS

LARGE ROLLER BEARINGS

AMONG THE INGREDIENTS OF GASO SUPREMACY

Large Valve Openings
Individual Valve Chambers
Deep Stuffing Boxes
No Overlapping of Rods
Babbitt Lined Shell Bearings
Flood Lubrication
Large Roller Bearings
Alloy Steel Cranks Set at 90° Angle
Alloy Steel Lapped Herringbone Gears

The selection of Gaso Pumps to power the army's military pipelines was a carefully made choice, based on an established performance record. It is a record of long, trouble-free service, with an amazing capacity to resist even normal frictional wear. Such a record doesn't just happen — it is the result of a determined policy to engineer into every last part of a Gaso Pump the highest attainable measure of life and service. The roller bearings in which we mount the crank and pinion shafts are part of this policy. They are the finest roller bearings we can buy, made extra large to assure extra protection . . Gaso Pump & Burner Mfg. Co., 902 East First Street, Tulsa, Okla. Export Office: 149 Broadway, New York. Shreveport: W. L. Somner Co., 419 Lake St. Los Angeles: Production Equipment Co., 651-653 E. Gage Av.



GASO PUMPS

for every oil industry need

Republic YOURS

SERVING YOU from

45

STRATEGICALLY LOCATED POINTS

At REPUBLIC we know how essential it is for you to have adequate supplies available when and where you need them. That is why you always find a REPUBLIC store near the scene of your operations. Likewise, we know you expect to find in these stores only the best in every product to meet the requirements of the job at hand. This requires experience and selective "know-how" on our part.

When hundreds of items of highly specialized equipment are required at widely scattered points, it is easy to see why the job of supply is one for specialists.

REPUBLIC IS DEDICATED TO THE ONE PROPOSITION OF SUPPLY

Our 45 service points are backed by 34 years of association with the growth and development of the oil industry. This plus a trained staff organized to anticipate, as well as satisfy, the oil man's need, and a select list of manufacturers, assures the best product, at the proper place, for every purpose.

ALWAYS CALL REPUBLIC

For Everything BEST in PRODUCTS and SERVICE

OIL WELL • PIPE LINE • GASOLINE PLANT AND REFINERY SUPPLIES

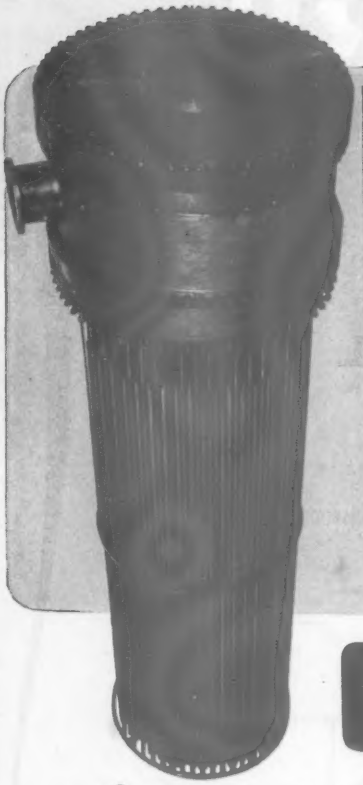
SUPPLY STORE

Republic Supply COMPANY

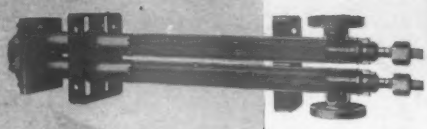
GENERAL OFFICES · · · HOUSTON 1, TEXAS

REPUBLIC STEEL

Reg. U. S. Pat Off.



RANGE



OF SIZE
AND SERVICE

G-FIN...

the most widely applicable heat transfer surface

Here's a fact of significance to all users of heat transfer apparatus... G-Fin elements are applicable to every type of unit.

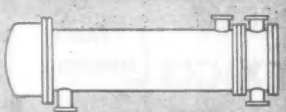
The list would be almost endless . . . it includes heaters, coolers, condensers, heat exchangers; the range covers small twin sections to enormous alkylation contactor bundles; and the fluids handled include practically every liquid, vapor and gas, clean or dirty, light or heavy, at pressures up to 2000 lb. and at temperatures well over 1000°F.

There are many reasons for the wide adaptability of G-Fin elements. This patented design of heat transfer surface is far more effective than bare tubes for transfer of heat to or from fluids of high viscosity or low heat conductivity . . . it can be used in standard, interchangeable units that form installations of flexible capacity . . . it provides fluid passages of uniform cross-sectional area and high velocity to prevent clogging . . . and the units in which it is used can be made particularly sturdy, convenient to handle, and with minimum maintenance.

Write for bulletins describing the application of G-Fin elements to services in which you are interested.

THE GRISCOM-RUSSELL CO.
285 Madison Ave., New York 17, N. Y.

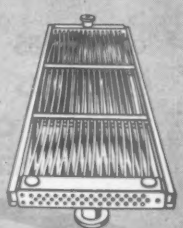
ONLY G-R BUILDS THIS WIDE VARIETY OF HEAT TRANSFER APPARATUS



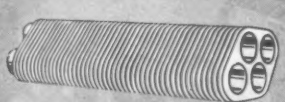
SHELL and BARE TUBE
Heaters, Coolers, Condensers, Heat Exchangers

G-FIN
Longitudinal-finned elements for greater heat conductivity

K-FIN
Helical-finned elements for vapors and gases

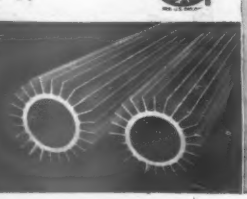


BENTUBE SECTIONS
with scale-shedding elements for hard or salt water



TUBEFLO SECTIONS
Non-clogging design for residuum and other dirty fluids

GRISCOM-RUSSELL
TWIN G-FIN SECTION
The Universal Heat Exchanger



Extensible-Tip in CONDOR ENDLESS BELTS

an important MANHATTAN development
that steps up belt life and performance

ADVANTAGES

1. Increases flexibility at splice.
2. Can be operated over smaller pulleys.
3. Can be operated at higher speeds and heavier loads.
4. Prolongs splice life 3 to 10 times.
5. Reduces belt and maintenance costs.

All warp threads in outer plies are cut by suitably spaced perforations filled with "live" FLEXLASTICS, which are then vulcanized to become "elastic rivets." These stretch and relax progressively (see illustration) as they pass over the arc of contact, providing stress relief for every warp thread, permitting use of smaller pulleys on short-center drives and higher speeds.

Above: Ordinary type of splice which failed when ply end gave way.
Below: A splice with EXTENSIBLE-TIP, still unbroken after running 10 times as long under identical conditions. This increased life is due to ***extended-area stress relief.***

A belt made endless in the conventional manner has all flexing strain ***concentrated in a line*** at the ends of top and bottom plies. This concentration of strain soon ruptures the bond between the ends of the outer plies and the rest of the belt and unnecessarily shortens service life.

MANHATTAN'S EXTENSIBLE-TIP—an exclusive, patented Strength Member development—provides multiple stress relief, uniformly ***distributed over an area*** of the belt where the duck ends. In addition, the end is welded to the adjacent ply by "elastic rivets" made from special FLEXLASTICS.

It is this extended area of stress relief that makes the Extensible-Tip last as long as the belt, lets you run the belt at higher speeds, over smaller pulleys, on short-center drives, and increases its service life from three to ten times over ordinary methods of making the same belt endless.

You protect the continuity of your production when you use MANHATTAN Endless Belts, all of which are made with the ***extended-area stress relief*** provided by the MANHATTAN EXTENSIBLE-TIP.

The term FLEXLASTICS is an exclusive MANHATTAN trade mark. Only MANHATTAN can make FLEXLASTICS. Condor Belts are now made in the dark, war-time color.

THE MANHATTAN RUBBER MFG. DIVISION
OF RAYBESTOS-MANHATTAN, INC.
EXECUTIVE OFFICES AND FACTORIES PASSAIC, NEW JERSEY

His Fist

hit the desk

"If this company isn't using Gravel Packing to increase production and save repairs, we at least, ought to know why."

PARDON the big boss for being a bit emphatic, but he's right.

When a method has demonstrated its ability to maintain greater and longer lasting well production at *reduced* maintenance cost where loose producing sand is encountered, it should be thoroughly investigated.

Gravel Packing does just that:—

1. It saves both initial and replacement cost of expensive screens and liners.
2. It maintains a higher rate of flow.
3. It eliminates time off production for redrilling and clean out.
4. It saves costly and recurring pump and equipment repairs.

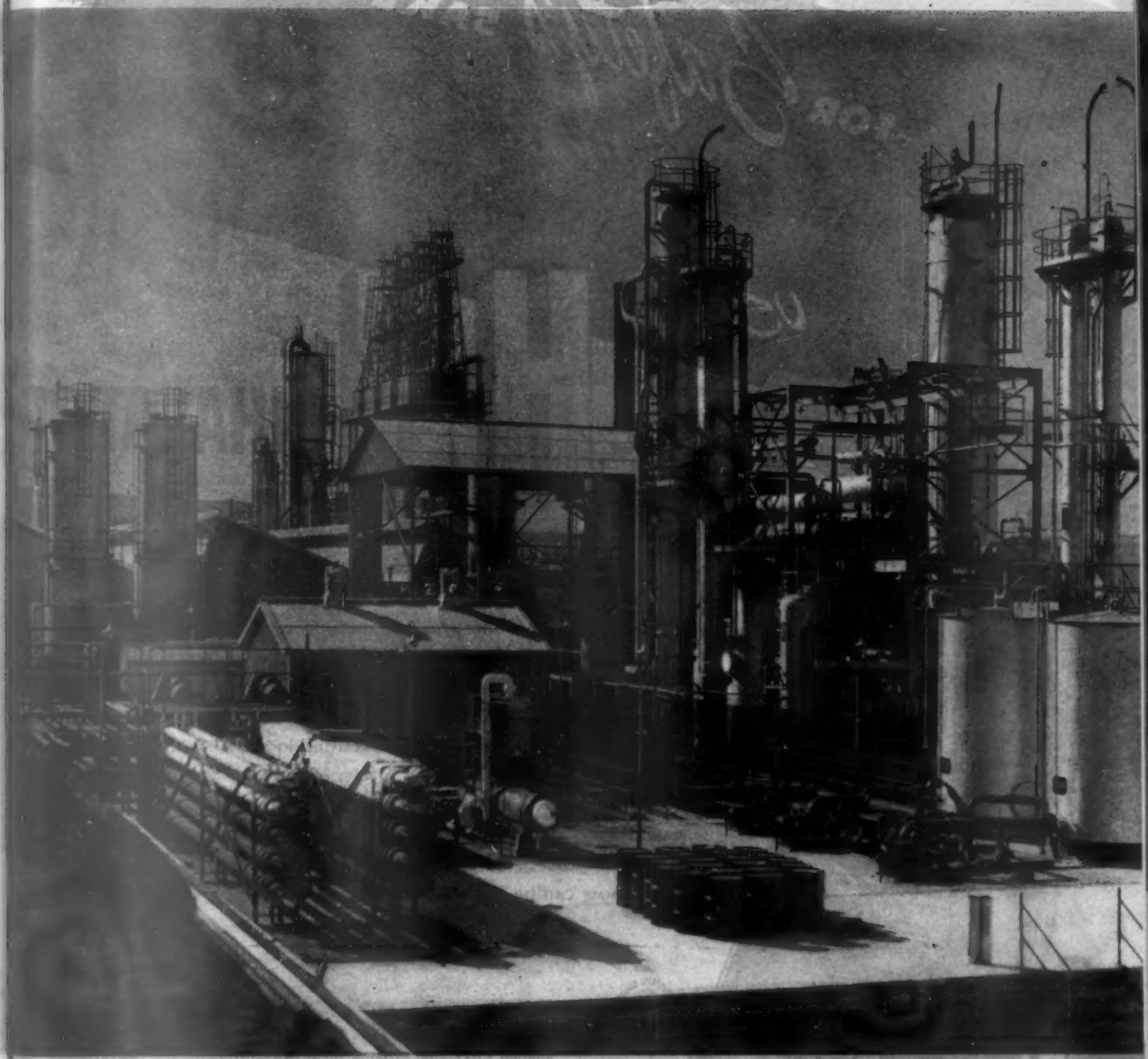
Can your company afford to lose these advantages?

TEXACO

TEXACO DEVELOPMENT CORPORATION

A Subsidiary of The Texas Company

SPECIALIZATION...



THE KEY TO BECHTEL-McCONE'S FAST AND EFFECTIVE SERVICE

From engineering design to final construction, Bechtel-McCone's years of experience in the Petroleum and Chemical Industries result in an intelligent approach to their problems.

Bechtel McCone Corporation

ENGINEERS ★ CONSTRUCTORS

BMC

LOS ANGELES • SAN FRANCISCO

FOR Safety's SAKE
WHEN SECONDS ARE PRICELESS
...IN LIFE-SAVING RESUSCITATION
USE...
The H-H INHALATOR
In cases of asphyxia, every passing instant is vital . . . any delay or interruption in applying resuscitation can be fatal! Artificial respiration by the Schaefer prone pressure method must begin immediately. On arrival the H-H Inhalator is applied to the patient without break in respiratory rhythm or change of position.
The H-H Inhalator supplies life-giving oxygen-carbon dioxide according to lung demand . . . no suction, no pressure are employed . . . recovery is stimulated gently, safely, effectively.
Use the H-H Inhalator for results! Proved by over 25 years of world-wide service . . . for simple, safe, gadget-free operation . . . for speed in application! Shipments now can be made from stock.
OXYGEN WITH CARBON DIOXIDE
The M·S·A H-H INHALATO
Write for your copy of the H-H Inhalator Bulletin CA-9, and arrange for a demonstration at once!
MINE SAFETY APPLIANCES CO.
BRADDOCK, THOMAS AND MEADE STREETS
PITTSBURGH 8, PA.
DISTRICT REPRESENTATIVES IN PRINCIPAL CITIES
IN CANADA
MINE SAFETY APPLIANCES COMPANY OF CANADA, LIMITE
TORONTO . . . MONTREAL . . . CALGARY . . . NEW GLASGOW, N. S.

PIPE AND TUBE FITTINGS

- any type - any metal

As specialists in PIPING, Grinnell is your logical source of performance-proved Fittings for every pipe or tubing installation.

The Grinnell line of Pipe Fittings includes screwed, socket, flanged and welding types, in all standard metals. Tube Fittings of Superseal, "AN" Aircraft and S.A.E. designs are available in aluminum, bronze, steel, air furnace malleable and plastics.

Available from your local Grinnell jobber, or from any of the Grinnell branch warehouses listed below.

GRINNELL COMPANY

Executive Offices: Providence 1, R. I.

Branch Warehouses:

Atlanta 2, Ga.	Los Angeles 13, Cal.	Providence 1, R. I.
Charlotte 1, N. C.	Minneapolis 15, Minn.	St. Louis 10, Mo.
Chicago 9, Ill.	New York 17, N. Y.	St. Paul 2, Minn.
Cleveland 14, O.	Oakland 7, Cal.	San Francisco 7, Cal.
Houston 1, Tex.	Philadelphia 34, Pa.	Seattle 1, Wash.

GRINNELL

WHENEVER PIPING IS INVOLVED

ENGINEERING SKILL MAKES THE *Big Difference!*

It is true that the fundamental mechanical details of practically every truck winch are similar. As a truck winch has comparatively few working parts it is much less complicated to operate and maintain than more complex machines. However, Braden Engineers have always felt that even basic winch designs could be improved upon. That's why, year after year, they have strived for improvement in the type of metals and alloys used in vital parts. They have constantly tested new gear designs and brake assemblies in the laboratory and in actual use. Thus BRADEN Truck Winches have attained a high degree of ruggedness and safety never before found in any winches of equal rated capacities.

Ask your dealer for complete information concerning BRADEN "Engineered" Truck Winches, or write direct to the factory.

"Buy BRADEN . . . They are SAFER"

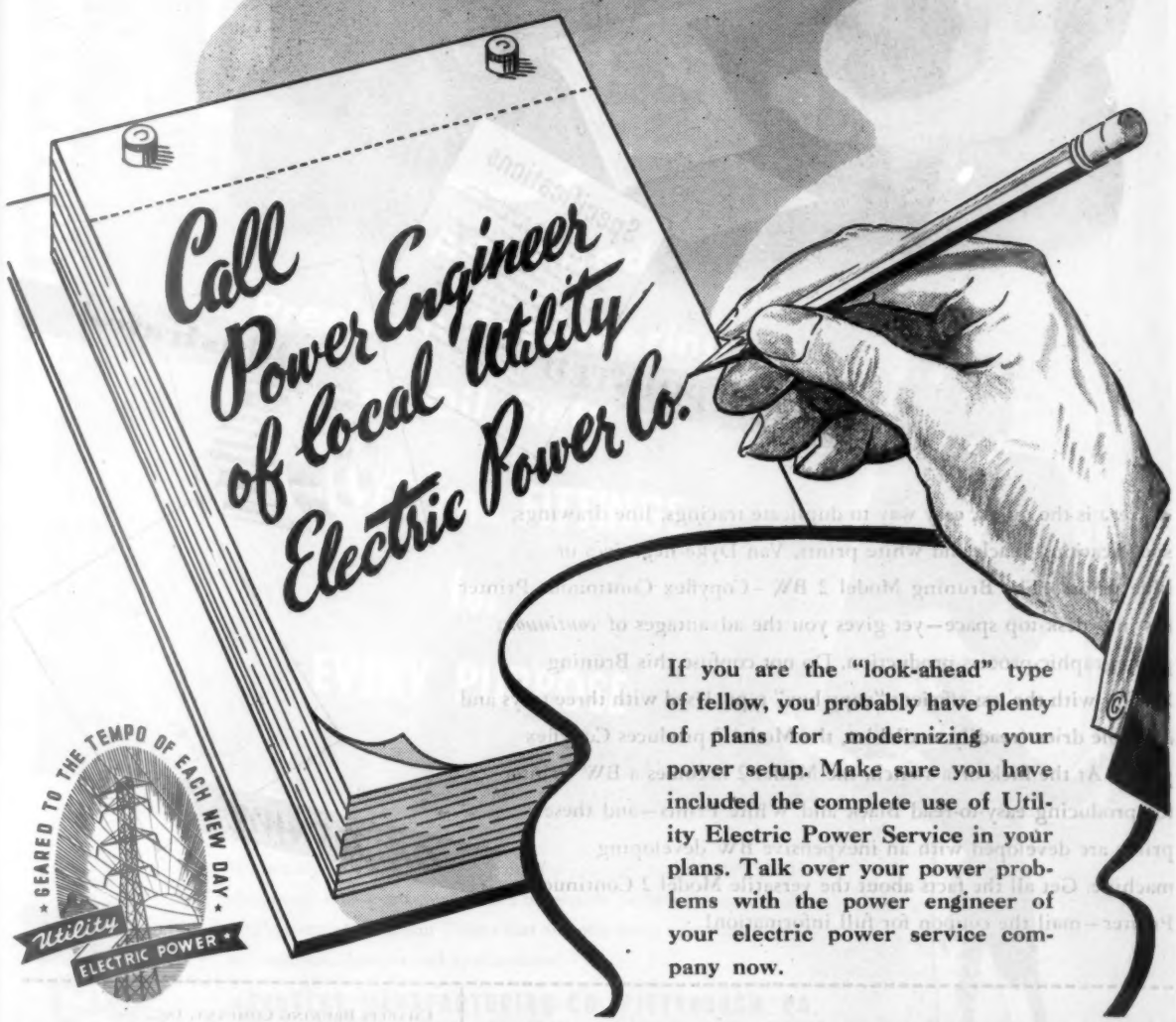
Pictured above is Braden Model M12-18B equipped with the new oil cooled fully adjustable, automatic safety brake.

BRADEN WINCH COMPANY
1001 East Admiral Boulevard

BRADEN
"STANDARD OF THE OIL COUNTRY"
Winches

TULSA 3,
Oklahoma

MAKE A NOTE NOW TO.....



If you are the "look-ahead" type of fellow, you probably have plenty of plans for modernizing your power setup. Make sure you have included the complete use of Utility Electric Power Service in your plans. Talk over your power problems with the power engineer of your electric power service company now.

Use Utility Electric Power!

PETROLEUM ELECTRIC POWER ASSOCIATION

Box 1498, Oklahoma City, Oklahoma

NOW...Broaden Your Duplicating Scope!

• Here is the quick, easy way to duplicate tracings, line drawings, specifications, black and white prints, Van Dyke negatives or blue prints! The Bruning Model 2 BW—Copyflex Continuous Printer fits into desk-top space—yet gives you the advantages of *continuous* photographic-process production. Do not confuse this Bruning Printer with the less efficient "copy box" type. Used with three trays and a simple drier (readily available), the Model 2 produces Copyflex prints. At the flick of a switch, the Model 2 becomes a BW Printer for producing easy-to-read Black and White Prints—and these prints are developed with an inexpensive BW developing machine. Get all the facts about the versatile Model 2 Continuous Printer—mail the coupon for full information!

CHARLES BRUNING COMPANY, INC.

Since 1897

NEW YORK	CHICAGO		LOS ANGELES
Birmingham	Boston	Detroit	Houston
Kansas City	Milwaukee	Newark	Pittsburgh
St. Louis	San Francisco	Seattle	

CHARLES BRUNING COMPANY, INC.,
4732-38 Montrose Avenue, Chicago 41, Illinois

Please send me complete information on your Model 2 BW—Copyflex Continuous Printer—and on other Bruning printing and developing machines for making Bruning Black and White Prints.

Name.....

Address.....

City..... *State*.....

keep your eye on
KEROTEST
for Advanced
Precision Engineering
in Oil Field
VALVES and FITTINGS
for
EVERY PURPOSE
To simplify your Valve problems entrust your requirements to Kerotest engineers, now—you can be sure of reliable performance, durability and low maintenance in Valves that embody every new development in materials, designs and applications.
KEROTEST MANUFACTURING CO. PITTSBURGH, PA.
KEROTEST
Valves... Accessories... Fittings...

Bethlehem Serves the Oil Industry

These all-welded oil storage tanks, each with 139,000 barrels' capacity, are typical of the fabricated steel construction work which Bethlehem performs for the oil industry.

By broad experience, by virtue of being a fully-integrated, nation-wide organization, Bethlehem is equipped to handle fabrication jobs with speed and efficiency. Inquiries are welcomed from the oil industry relating to all types of structures—tanks for storage, petroleum refining plant vessels and structures, fabricated pipe of diameter beyond rolled sizes, warehouses and barges.

FABRICATED STEEL CONSTRUCTION

BETHLEHEM STEEL

ready reference

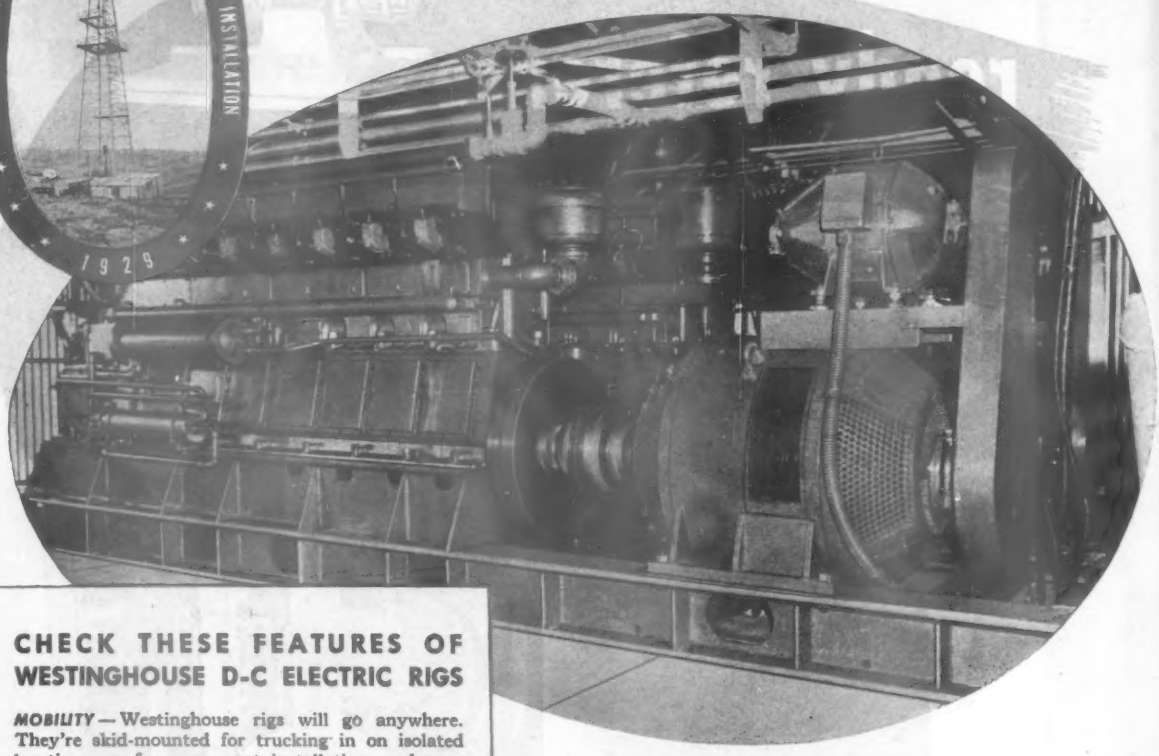
Whether the liquids be light or heavy, the temperatures high or low, there is a Pacific *Engineered* Pump designed FOR THE SPECIFIC PURPOSE. Pacific Pumps are precision manufactured to fine dimensions and deliver top pumping efficiency with minimum of maintenance in refineries, pipelines or boiler feed service. Available in an unsurpassed range of types and sizes, you'll find them described and illustrated in Pacific's big section of the Refinery Catalog. When your requirements call for pumps, refer to this section—or even better—send for Pacific Catalog No. 80 today.

PACIFIC PUMPS, Inc.,
Huntington Park, Calif.

One of the Dresser Industries. Mid-continent Division: 915 E. 2nd St., Tulsa, Okla. Export: 30 Rockefeller Plaza, New York.

PACIFIC *Engineered* PUMPS

on location sooner



CHECK THESE FEATURES OF WESTINGHOUSE D-C ELECTRIC RIGS

MOBILITY—Westinghouse rigs will go anywhere. They're skid-mounted for trucking in on isolated locations, or for permanent installation on barges or trailers. Units are light—easy to handle.

FLEXIBILITY—When the power is transmitted through electric cables, you can locate your power plant and slush pits, relative to the derrick floor, to meet any condition—no time lost in adapting rig to a new location.

EASE OF INSTALLATION—Electric drilling rigs are ready to go, almost as soon as they're hauled in on the lease—connect flexible power cables, and plug in foolproof control circuits.

SMOOTHNESS OF OPERATION—Electric control gives smooth, fast load pickup—with no engine stalling. Full power for hoisting—or drilling—is instantly available through pushbutton control at the draw-works.

ECONOMY—Drilling costs you less per foot of hole with Westinghouse electric rigs—you save setup and drilling time. You'll save on maintenance costs, too, with reliable, economical drive.

EXPERIENCE—Since 1929 Westinghouse has built over 40 d-c electric rigs—and has had actual rig and field experience on every type—cable tool or rotary, deep or shallow drilling, a-c or d-c power.

...WITH WESTINGHOUSE ELECTRIC DRILLING RIGS

Mobility—that's why you can be on the new location sooner with Westinghouse electric rigs.

They're light—easy to handle—skid-mounted. Truck them to isolated locations, mount them on trailers or barges—they'll go *anywhere*. The complete electric rig is made up of a number of small, compact units, quickly moved. The use of Class B insulation reduces the size and weight of electrical equipment. The use of direct-connected, high-speed generators provides a compact, simple power unit—easy to handle.

Westinghouse electric rigs are the result of years of ***actual rig and field experience***. The first Diesel-electric drilling rig was built by Westinghouse in 1929. Since then we've built more than forty d-c rigs, and we've had experience on every type—from the simple single-generator, semi-electric rig to the modern multiple-generator, full-electric rig.

Whether you use rotary rigs for deep or shallow wells—wildcat or proved lease drilling, Westinghouse experience will pay off in more hole, ***faster***, at less cost. For complete information, call your nearest Westinghouse representative, or write for Booklet 3038. Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa. J-94675

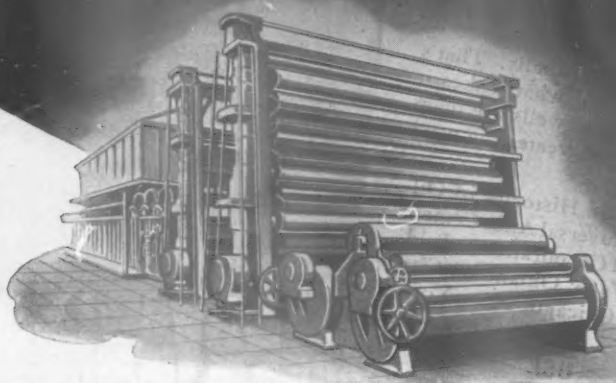
Westinghouse
PLANTS IN 25 CITIES . . . OFFICES EVERYWHERE

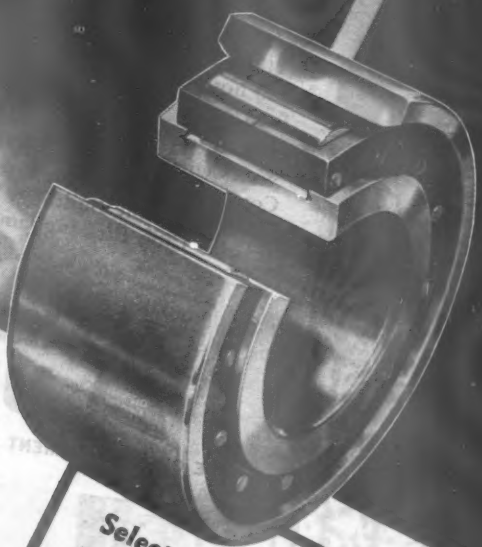
ELECTRICAL EQUIPMENT FOR THE PETROLEUM INDUSTRY

For cementing with a
MARGIN of SAFETY
IMPROVED UNAFLO—the cement with the retarded set—provides a margin of safety when accidents and unforeseen delays pile up minutes after cementing has started.
Unaflo does not merely have a slow set. It has a *retarded,* a delayed, a postponed set! Thus it remains fluid and pumpable for the full period of retardation and then hardens normally. That's what oil men like about it. That's what makes it "FIRST CHOICE," especially where wells are deep and hot. The harder the job, the greater the need for Unaflo!
Send for a free copy of "Case Histories of Oil-Well Cementing." Write to Universal Atlas Cement Company (United States Steel Corporation Subsidiary), Amicable Building, Waco; Oklahoma City; Kansas City; Birmingham; Chicago; New York.
UNAFLO
Oil Well Cement
USE
IMPROVED
UNAFLO
THE OIL-WELL CEMENT WITH THE RETARDED SET
OG-U-60

ROLLWAY RIGHT-ANGLE LOADING

LONGER BEARING LIFE OVER LONGER PERIODS OF CONTINUOUS OPERATION . . .





When heavy loads must be carried from 12 to 24 hours a day, let Rollway Solid Cylindrical Roller Bearings do the job. They'll stand up longer, require less service attention. The reason is simple—*right-angle loading*. That means the loads are simplified, too. Broken down into their two simple components of pure radial and pure thrust—each carried on a separate bearing assembly at right angles to the roller axis! There are no oblique loads, no compound resultants; the unit pressures per roller are substantially reduced and the life expectancy of the bearing is relatively increased.

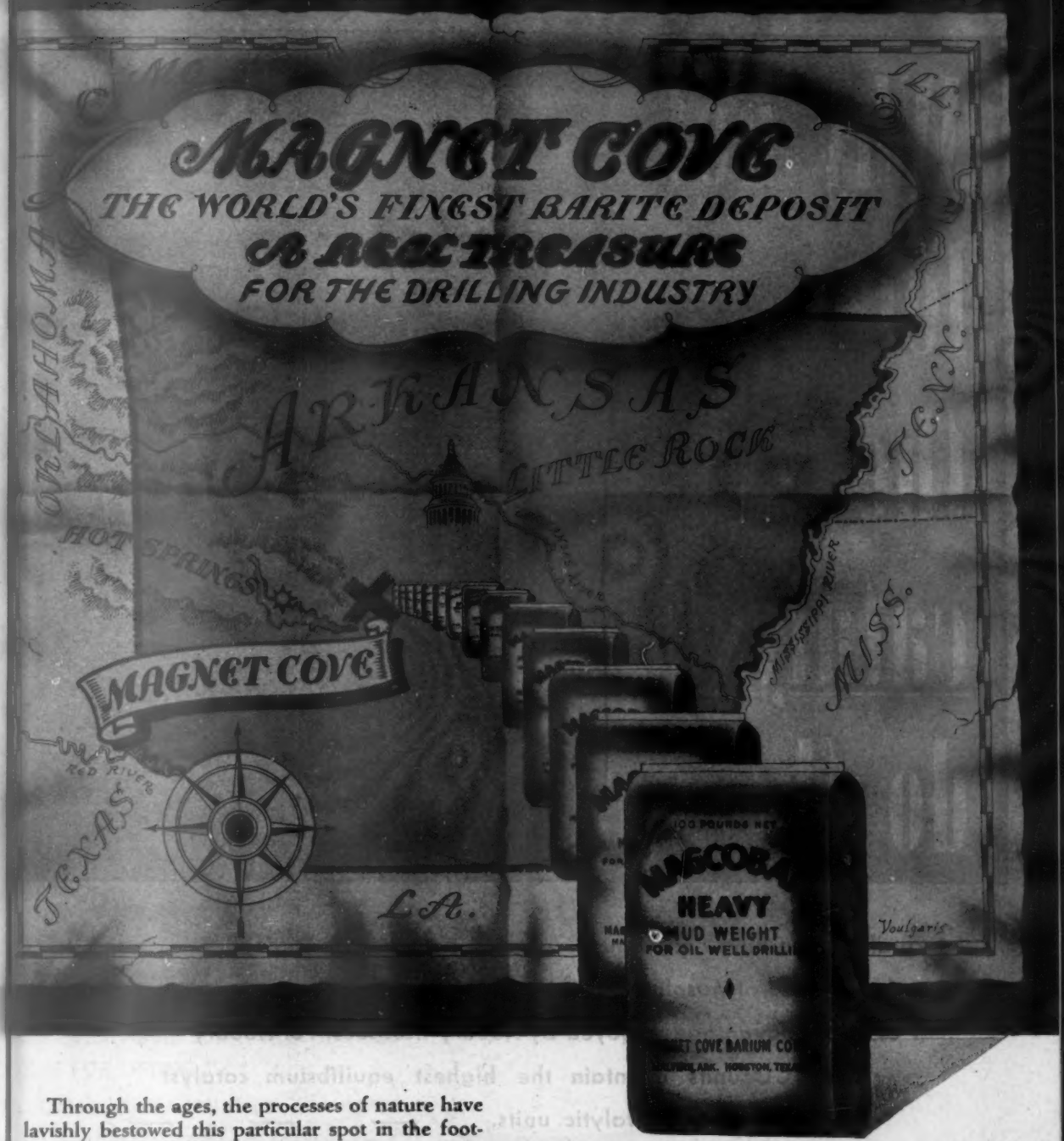
Select Bearings Carefully

Every field of general industry has its own bearing problem. No single type of bearing will prove adequate for every kind of industrial application. Let our specialists help you to select the proper bearing for your needs.

ROLLWAY BEARING CO., INC.
Syracuse, N. Y.
1908-1945

ROLLWAY CYLINDRICAL ROLLER BEARINGS

SALES OFFICES: Philadelphia • Boston • Pittsburgh • Youngstown • Cleveland • Detroit • Chicago • St. Paul • Houston • Tulsa • Los Angeles



Through the ages, the processes of nature have lavishly bestowed this particular spot in the foothills of the Ozarks with the world's greatest barite deposit.

It is from this rich natural treasure at Magnet Cove, Arkansas, that we mine and manufacture MAGCOBAR. Our own unique method of processing this fine ore removes practically all extraneous matter, thus producing a high-purity mud weight for drilling fluid. The superior qualities of Magcobar have been proven time and again by the oil industry in the drilling of deep, high pressure wells.

Magcobar

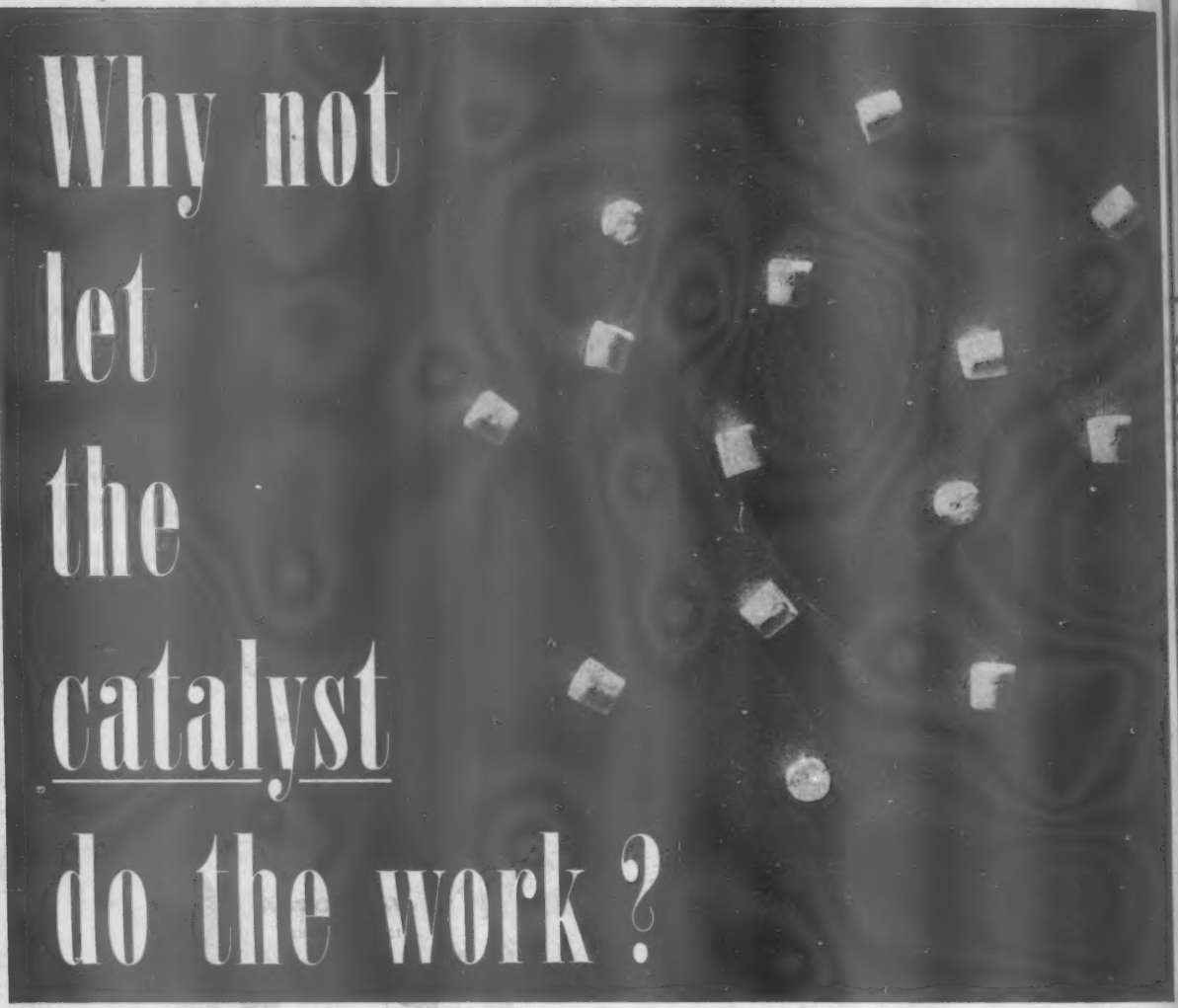
Complete

DRILLING MUD SERVICE

MAGNET COVE BARIUM CORPORATION

Malvern, Arkansas — Houston, Texas

Why not let the catalyst do the work?



In catalytic cracking, maximum catalyst activity produces optimum yield of gasoline—maximum profits. This is another of many advantages enjoyed by Houdry licensees. For Houdry and TCC units maintain the highest equilibrium catalyst activity of all catalytic units.

HOUDRY PROCESS CORPORATION, WILMINGTON, DEL.

Houdry Catalytic Processes and the TCC Process are available through the following authorized firms:

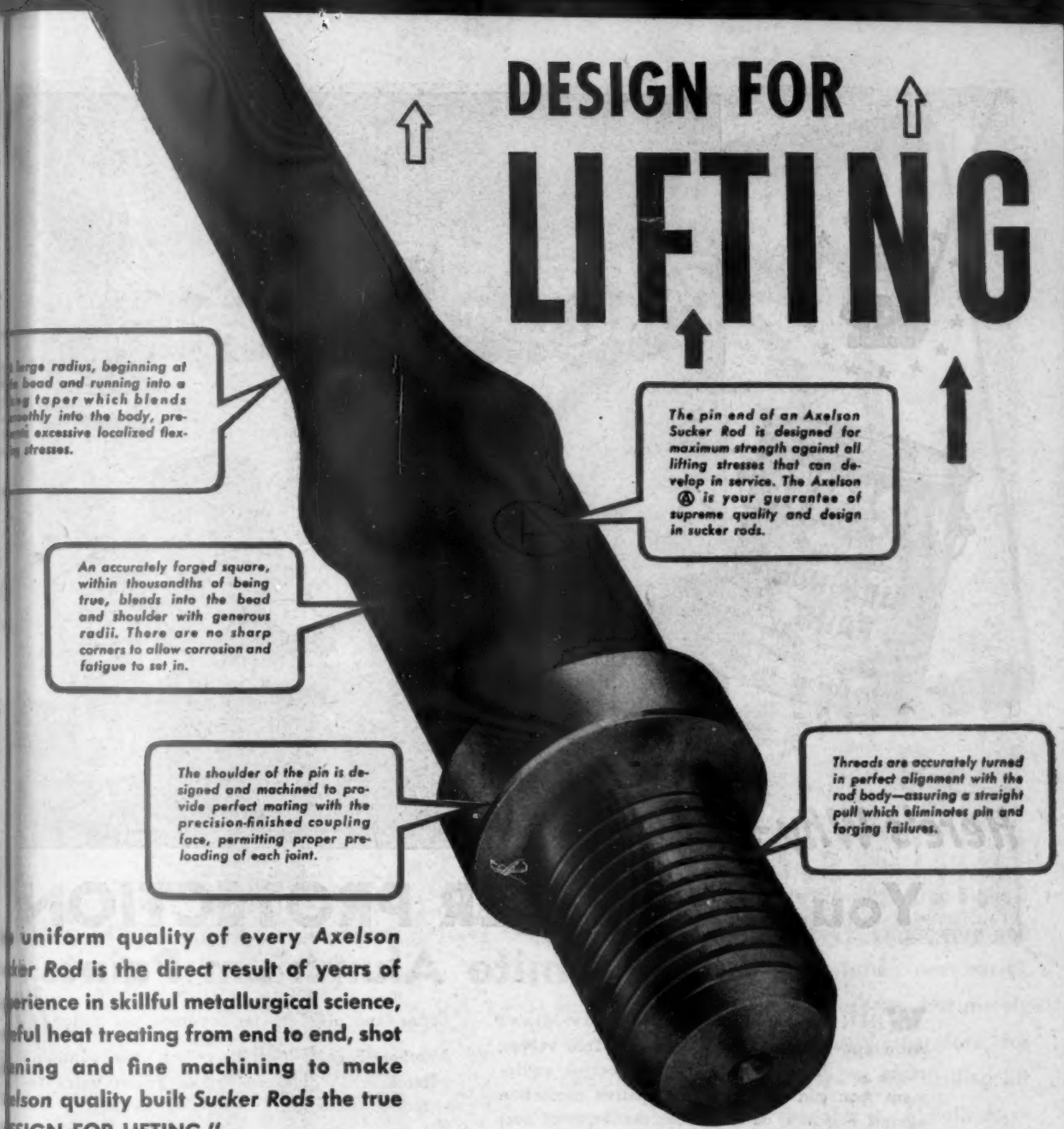
E. B. BADGER & SONS CO.
Boston, Massachusetts

THE LUMMUS COMPANY
New York City, New York

BECHTEL-McCONE CORP.
Los Angeles, Calif.

HOUDRY CATALYTIC PROCESSES
... FOR VICTORY IN WAR ... FOR PROGRESS IN PEACE

DESIGN FOR LIFTING



large radius, beginning at the bead and running into a long taper which blends smoothly into the body, prevents excessive localized flexing stresses.

The pin end of an Axelson Sucker Rod is designed for maximum strength against all lifting stresses that can develop in service. The Axelson Ⓐ is your guarantee of supreme quality and design in sucker rods.

An accurately forged square, within thousandths of being true, blends into the bead and shoulder with generous radii. There are no sharp corners to allow corrosion and fatigue to set in.

The shoulder of the pin is designed and machined to provide perfect mating with the precision-finished coupling face, permitting proper preloading of each joint.

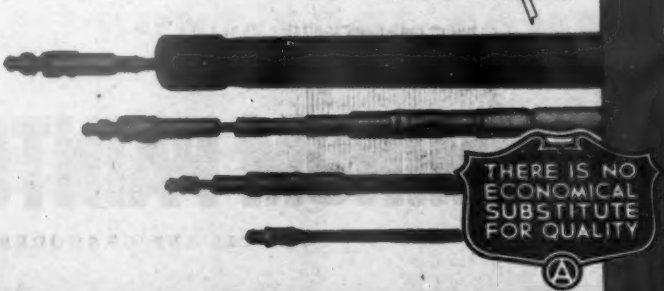
Threads are accurately turned in perfect alignment with the rod body—assuring a straight pull which eliminates pin and forging failures.

uniform quality of every *Axelson* *ker Rod* is the direct result of years of perience in skillful metallurgical science, eful heat treating from end to end, shot ening and fine machining to make elson quality built *Sucker Rods* the true ESIGN FOR LIFTING."

ELSON MANUFACTURING COMPANY

TS—6160 So. Boyle Avenue (P. O. Box 98, Vernon Station), Los les 11, Calif. • 3844 Walsh Street, St. Louis 16, Missouri. CES—50 Church Street, New York City 7 • National Bank of Tulsa g, Tulsa 1, Okla. • Avda Pte. R. Saenz Pena 832, Buenos Aires, ina • DISTRIBUTORS—Jones & Laughlin Supply Company • Great rn Tool & Supply Company • C. C. McDermond, Apartado 331, aibo, Venezuela • Industrial Agencies, Ltd., San Fernando, Trinidad, B.W.I.

BUY WAR BONDS

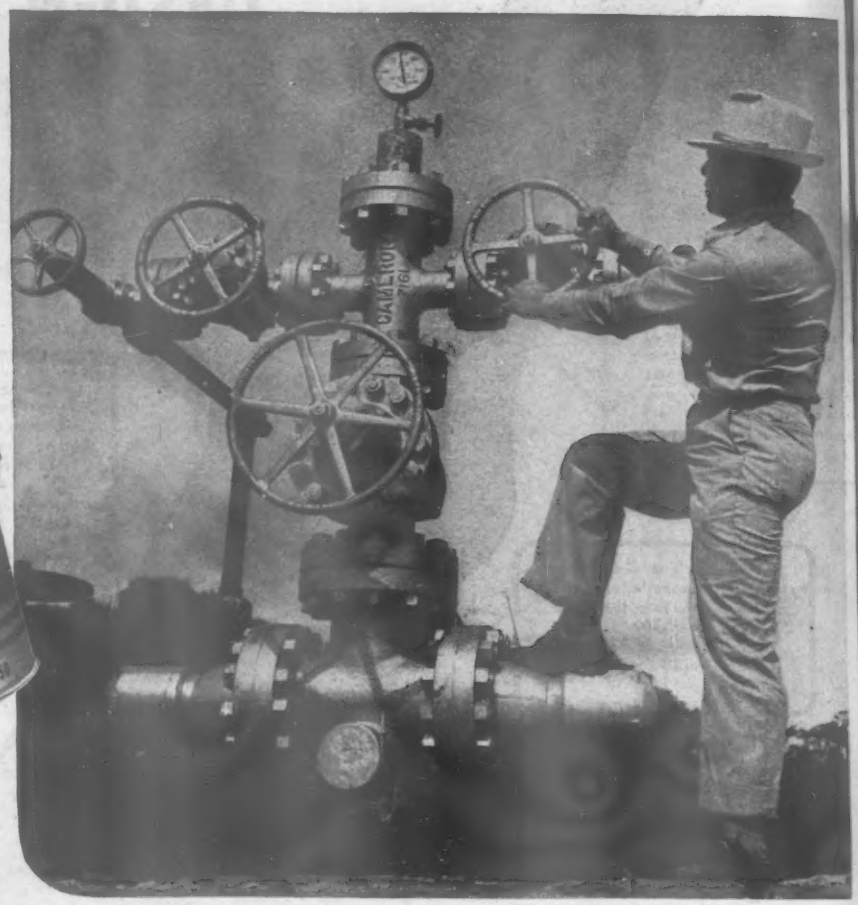


AXELSON

SUCKER RODS

AND

DEEP WELL PLUNGER PUMPS



Here's Why-

You Get BETTER PROTECTION with Permite Aluminum Paints!

WHEN you apply Permite Ready-Mixed Aluminum Paints to your Christmas Tree valves, tanks, gas holders, pipe lines and other equipment, you can be certain of positive protection against moisture, corrosion and extremes of heat and cold. For these paints are definitely different.

Only 99+% pure, finely screened, aluminum is used for the pigment. The pigment is scientifically conditioned and completely mixed by an exclusive, vacuum explosion process, developed by Permite engineers. As a result, Permite Paints overlap or "leaf" better. They apply easily and smoothly, they have lasting brilliance, hide better, and give greater coverage per gallon.

Another Permite "exclusive" is the synthetic vehicle which makes Permite Paints extra resistant to oxidation.

Their brilliant, metal-like finish provides long-lasting protection that cuts painting costs. Their high reflectivity reduces losses of crude or gasoline due to evaporation. And being completely ready-mixed, Permite Aluminum Paints eliminate field mixing wastes of time and materials.

Use Permite for maximum protection and true painting economy.

ALUMINUM INDUSTRIES, Inc., CINCINNATI 25, OHIO

Permite Paint Division

PERMITE READY MIXED ALUMINUM PAINTS

HIGHEST CORE RECOVERY

The Hunt Wire Line Core Barrel has the highest core recovery because it takes a larger core and has a positive floating or non-rotating inner barrel. It has no part in cutting the core . . . but merely receives it. There is no necessity, therefore, for driving this barrel, which seats in the drilling bit rather than protruding through it. A hold-down latch retains the barrel in position to receive the core.

Get larger cores on your next job . . . with the Hunt Floating Barrel.

HUNT TOOL COMPANY

FIELD SHOPS: Houston, Bay City, Corpus Christi, Jennings, Harvey, Casper
EXPORT: Hunt Export Company, 19 Rector St., N. Y. C.

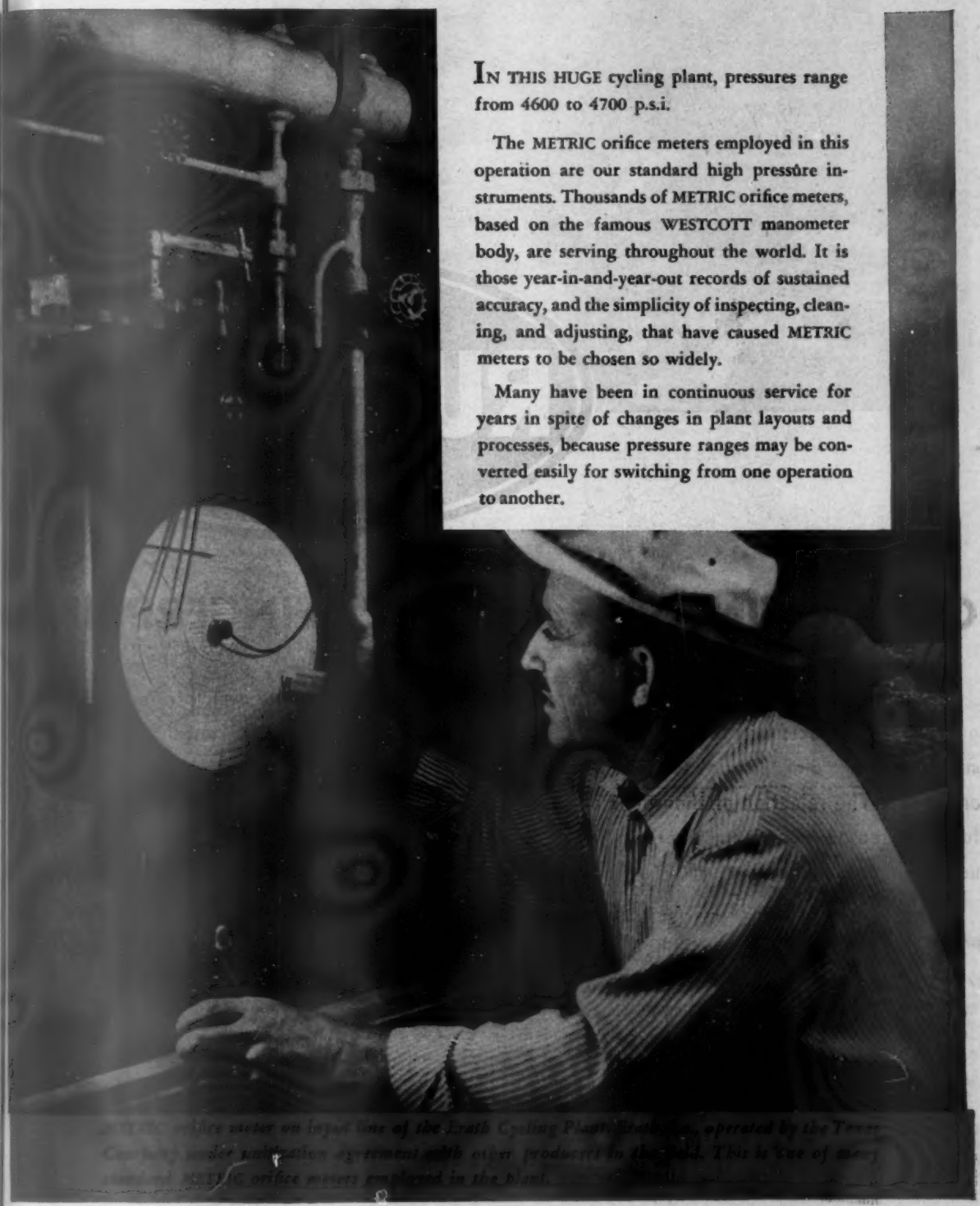
A BUSINESS BUILT ON *Good* SERVICE

These high pressures take th

AMERICAN METER COMPANY
INCORPORATED (ESTABLISHED 1836)

Albany • Baltimore • Birmingham • Boston • Chicago
Dallas • Erie • Houston • Kansas City • Los Angeles • New York • Philadelphia • Pittsburgh • San Francisco • Tulsa

the measure of a meter



IN THIS HUGE cycling plant, pressures range from 4600 to 4700 p.s.i.

The METRIC orifice meters employed in this operation are our standard high pressure instruments. Thousands of METRIC orifice meters, based on the famous WESTCOTT manometer body, are serving throughout the world. It is those year-in-and-year-out records of sustained accuracy, and the simplicity of inspecting, cleaning, and adjusting, that have caused METRIC meters to be chosen so widely.

Many have been in continuous service for years in spite of changes in plant layouts and processes, because pressure ranges may be converted easily for switching from one operation to another.

METRIC orifice meter on input line of the Erath Cycling Plant, Erath, La., operated by the Texas Company under cooperation agreement with other producers in the field. This is one of many additional METRIC orifice meters employed in the plant.

RUST-BAN

REG. U. S. PAT. OFF.

OUTWITTING THE TELLTALE FINGERPRINT

On finely machined parts the small amount of moisture and acid in a fingerprint can cause sufficient rust and pitting to sabotage the entire job. The rejection of thousands of parts for this reason has cost American industry untold time and money.

Rust-Ban 392 was developed to solve this problem. Its water-displacing properties give it a distinct advantage over previous rust-preventives of this type. It literally shoves water from metal surfaces and replaces it with a thin, almost invisible, film of rust preventive. Parts may be sprayed, dipped or rolled and will remain rust-immune through a long period of storage.

For more information consult your nearest Rust-Ban marketer.

RUST-BAN is sold by: Colonial Beacon Oil Co., New York City, Standard Oil Co. of Pennsylvania, Philadelphia, Pa., Standard Oil Co. of New Jersey, New York City and New Orleans, La., Humble Oil & Refining Co., Houston, Texas, The Carter Oil Company, Tulsa, Okla., Standard Oil Company (Ky.), Louisville, Ky., Gilmore Oil Company, Los Angeles, Cal., Standard Oil Company (Ohio), Cleveland, Ohio, Penola Inc., Pittsburgh, Pa., and Imperial Oil Ltd., Toronto, Canada.

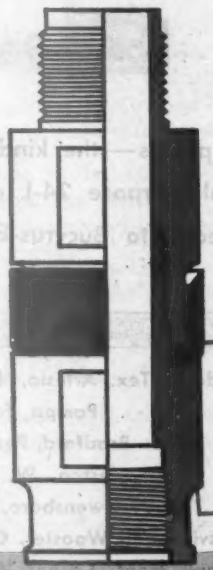
RUST-BAN—First Line of Defense Against Rust

Pay off faster with oilmaster CUP PUMPS

THERE IS NO OTHER CUP PLUNGER LIKE OILMASTER *

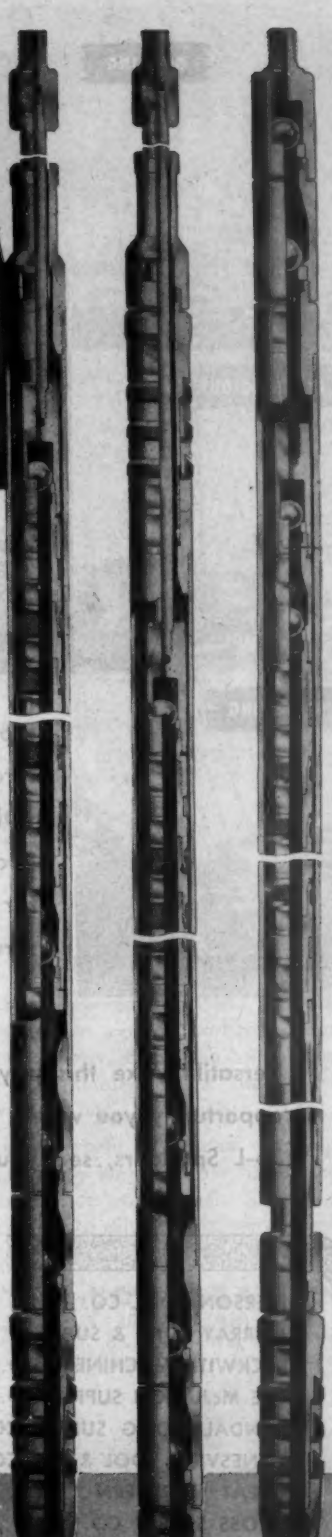
OILMASTER CUP PUMP is more than just another name. It is a *new* Cup Pump designed and developed by the Fluid Packed Pump Company to meet any and all pumping conditions where composition Plungers are used. The Oilmaster Plunger used in this new Cup Pump embodies the feature of *individual cup suspension* which permits each Cup to operate as a separate unit; consequently, the failure of one Cup does not constitute a complete Plunger failure. The heavy rigid construction of this new Cup Plunger assures positive alignment which in turn means more efficient operation and longer Cup life. Oilmaster Cup Pumps are equipped with an alloy steel one-piece Hardened and Polished Barrel Tube especially processed to withstand abrasion under the most severe pumping conditions likely to be encountered.

Oilmaster Cup Plungers have been installed in wells ranging in depth from 500 to 5000 feet, handling volumes from one barrel to one thousand barrels and, without exception, the performance of these cup plungers has been outstanding. This new, rugged cup plunger, in every instance, has proved its merit from the standpoint of durability and trouble-free service.



* Cross sectional view of the Oilmaster Cup Plunger showing method of individually anchoring each cup.

Patent applied for



Stationary Barrel Bottom Anchor

Stationary Barrel Top Anchor

Traveling Barrel Bottom Anchor

FLUID PACKED PUMP COMPANY • LOS NIETOS, CALIFORNIA

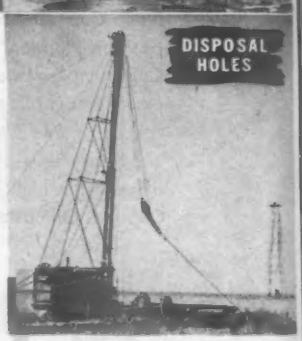
OILMASTER PRODUCTS

DISTRIBUTED BY THE NATIONAL SUPPLY CO.
EXPORT: THE NATIONAL SUPPLY CORP., 30 ROCKEFELLER PLAZA, NEW YORK

CO-DISTRIBUTORS: BERRY SUPPLY STORE, A. D. LARSON SUPPLY CO., MURRAY TOOL & SUPPLY CO. OF TEXAS, INDUSTRIAL SUPPLY CO.

Money-Making Versatility

Profitable handling of as many as eight different jobs—that's what owners are getting with Bucyrus-Erie Spudders everywhere. One Bucyrus-Erie, they have found, equips them for anything from top-to-bottom drilling to servicing and reconditioning.



Versatility like this pays off in reduced costs and increased profits—the kind of opportunity you want. For complete details on the mobile, all-purpose 24-L and 36-L Spudders, see your Bucyrus-Erie distributor or write directly to Bucyrus-Erie.

DISTRIBUTED BY:

IVERSON TOOL CO.	Tulsa, Okla., Odessa, Tex., Artesia, N. M.
MURRAY TOOL & SUP. CO. OF TEXAS	Pampa, Texas
BECKWITH MACHINERY CO.	Bradford, Penna.
THE McJUNKIN SUPPLY CO.	Charleston, W. Va.
RANDALL-ZOGG SUPPLY CO.	Owensboro, Ky.
ZANESVILLE TOOL & SUP. CO.	Zanesville and Wooster, Ohio
GREAT NORTHERN T. & S. CO.	Billings & Cut Bank, Mont., Casper, Wyo.
GROSS SUPPLY CO.	El Dorado, Kansas
H. C. KAUFMAN	Los Angeles 21, Calif.
OLYMPIC SUPPLY CO.	Seattle, Wash.
TURNER VALLEY SUPPLY CO., LTD.	Calgary, Alta.

4545

SO. MILWAUKEE BUCYRUS ERIE WISCONSIN

When reduction in size or cross-section of drill bits, drill stems, swivels, slips, pumps, kellys, blocks, draw-works and other drilling equipment is indicated to save weight or space, or to improve performance, the safe answer is alloy steels.

These fine steels have the highest strength values of all materials. They also provide the maximum strength per pound of material involved.

And that isn't all. They rank at the top in toughness. They have the ability to resist severe shocks and concentration or reversal of stresses. And they retain their high strength over long periods of time—thus resisting the attack of fatigue.

Alloy steels are unequalled in their uniform and predetermined response to hardening treatments —providing any depth of hardness desired and insuring against soft spots in wearing surfaces.

Alloy steels resist both sub-zero cold and red hot temperatures. They insure against embrittlement and failure due to conditions of extreme cold. They also can be used successfully where they must operate while extremely hot.

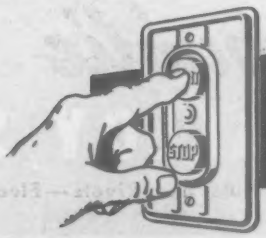
If you want to reduce weight or size of working parts—to insure safety—to lengthen life of service —and to cut maintenance costs — ask Republic, world's largest producer of alloy steels, what these fine steels can do for you.

REPUBLIC STEEL CORPORATION
Alloy Steel Division • Massillon, Ohio
GENERAL OFFICES • CLEVELAND 1, OHIO
Export Department: Chrysler Building, New York 17, New York

Republic
ALLOY STEELS

Also Casing—Tubing—Line Pipe—U[illegible] Studs, Bolts, Nuts and Rivets—Electrunite Boiler Tubes

Electric-powered pumping wells are producing their war quotas of vitally essential oil day in and day out . . . despite current shortages of maintenance personnel. For trouble-free pumping performance with 'round-the-clock certainty . . . you can depend on low-cost ELECTRIC POWER!



HOUSTON LIGHTING & POWER COMPANY

There's been a big change

★ Ever-increasing loads and heavier traffic have brought many essential improvements to transportation since the horse-car era... but only one outstanding change in tapered roller bearings.

That improvement came when Tyson developed the "all-rolls" design, with 30% more load-carrying rollers around the raceway. The extra capacity, longer life and extreme rigidity have won for Tyson an enviable reputation among operators of heavy-duty equipment.

If yours is a "tough job," count on Tyson to tame it.

TYSON BEARING CORPORATION, MASSILLON, OHIO

COUNT THE ROLLS · THE ROLLS COUNT

Tyson

THE LAST WORD IN ANTI-FRICTIONEERING

Cameron Type "ORC" 6000-lb. test, Series 900 API, hook-up on a deep wildcat test in West Texas.

ING FOR TROUBLE

. . . and loaded for bear!

Operators in proven high pressure areas or wildcat territory where high, and sometimes abnormal, pressures might be encountered need the positive protection that only Cameron Type "QRC" (Quick Ram Change) Pressure-Operated Blowout Preventers provide. Designed to close swiftly and seal unfailingly around pipe in the hole and to permit movement of the pipe under pressure to prevent sticking while heavy mud is circulated to subdue "kicking" well pressures, these new Cameron drilling control units have already successfully weathered numerous attempted blowouts. Employing many of the proven features of earlier models which have made Cameron blowout preventers the universal standard of comparison, these new Type "QRC" units offer several noteworthy mechanical improvements which further establish Cameron's leadership in that field.

QUICK FACTS ABOUT "QRC"

CHANGE RAMS IN A FEW MINUTES—Most outstanding of the new features presented in the "QRC" is the speed and ease with which rams can be changed. Whereas many hours were required for this operation on earlier models, rams can now be changed in a matter of minutes.

HIGH CLOSING RATIO—The "QRC" ratio of closing pressure to well pressure has been stepped up to eight to one, i.e., 1000 lbs. closing pressure will close the rams against approximately 8000 lbs. well pressure!

WELL PRESSURE EQUALIZED FRONT AND BACK OF RAMS—With the "QRC" design, well pressure is by-passed to the rear of the rams where it aids in closing, thus contributing to the more favorable high closing ratio. Ram locking screws are provided which also permit manual operation of the rams should the need ever arise.

WEIGHS 30% LESS THAN "SDA" MODELS—The low overall height and compactness of the "QRC" design facilitates transporting the unit as well as its assembly in drilling control manifolds in the field.

10,000 LBS. TEST PRESSURE MODELS—6" and 10" sizes in both Series 900 API, 6000 lbs. Test and Series 1500 API, 10,000 lbs. Test Pressure Models; 12" size in Series 900 API, 6000 lbs. Test Pressure Model only.

PLUS—Cameron's famous patented self-feeding ram packing, fluid pressure operation by remote control, self-centering rams and other time-tested mechanical features.

CAMERON IRON WORKS, INC.

711 MILBY ST., HOUSTON, TEXAS

Export: 74 Trinity Place, New York, N. Y. California: The Howard Supply Co., Los Angeles.
Rocky Mountain: Mountain Sales & Service, Casper, Wyo. Oklahoma: 310 Thompson Bldg., Tulsa.

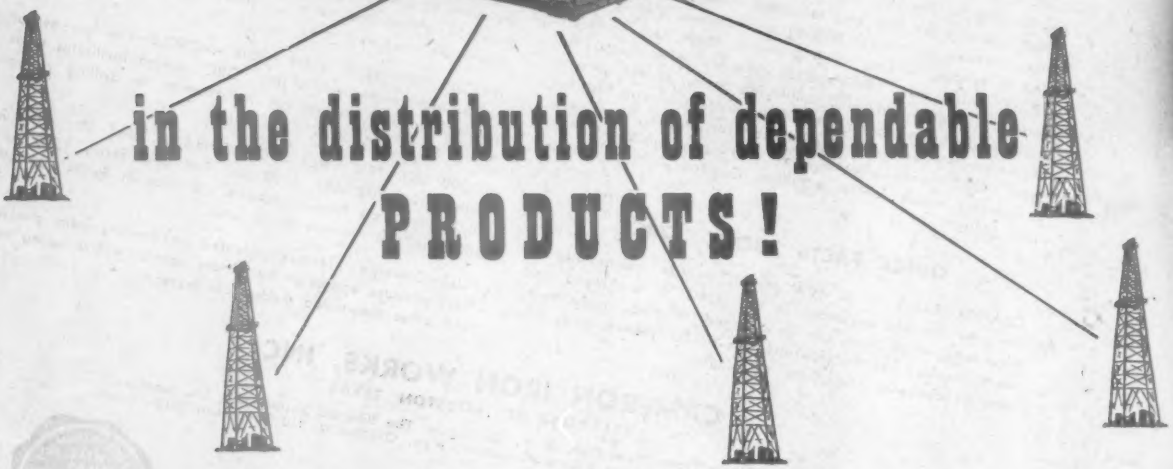
ASSOCIATION OF WELL HEAD EQUIPMENT MANUFACTURERS CERTIFIED

A 4-unit 6000-lb. test Cameron pressure operated hook-up on a deep Gulf Coast test well—2 Type "QRC" and 1 Type "SDA" blowout preventers; 1 Type "DV" flowline gate valve.

A Cameron Type "QRC" 6000-lb. test hook-up protecting a drilling well in a proven high-pressure field of South Texas. Note Cameron flowline spools and Flex-Seal valves is above manifolds.

VITAL LINK...

in the distribution of dependable PRODUCTS!



The conquest of Germany began with the discovery of the Drake well in 1859, and was sealed by the almost unbelievable vigor and resourcefulness of the industry which was born that day . . . Jarecki stores have, from the earliest days of this industry, served oil men as an on-the-spot source of everyday necessities . . . Through convenient field stocks of carefully selected and rigidly tested products these stores have, in the course of their 78-year history, met countless emergencies, saved countless hours, avoided countless delays, and thus contributed in a real sense to the tidal wave of petroleum that carried our men and machines to the heart of the Reich . . . Back of the Jarecki store in your field are the standards and traditions of a company that has been serving industry since 1852!

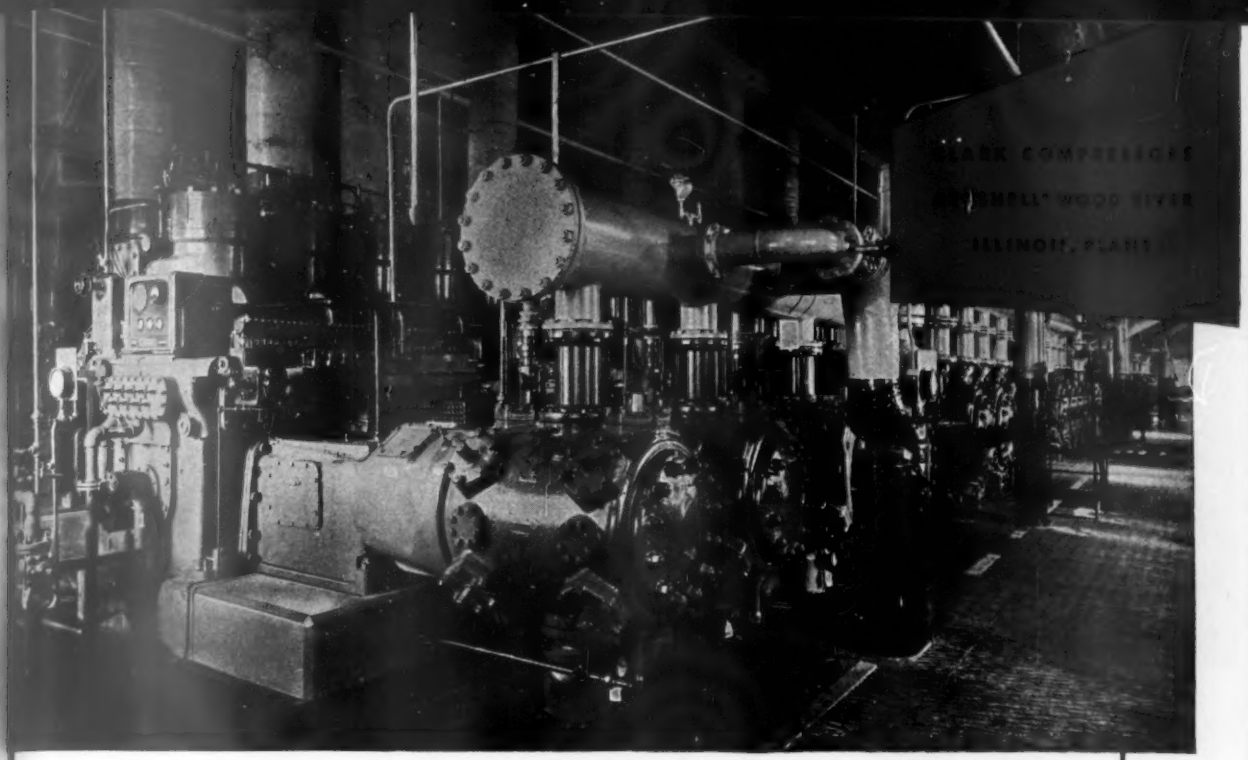
JARECKI

MANUFACTURING COMPANY

"Since 1852"

General Offices: St. Louis, Mo. Home Office and Factory: Erie, Pa., U. S. A. District Offices: Tulsa and Bartlesville, Okla.; Dallas and Houston, Texas; Mt. Pleasant, Mich.; Centralia, Ill.

BRANCH STORES AT ALL IMPORTANT PLACES IN THE OIL COUNTRY



Clark "Angle" Compressors in Fluid Catalytic Cracker Plant of Shell at Wood River, Ill.

Fluid Cat Crackers use more CLARK COMPRESSORS than any other make

IN Fluid Catalytic Cracking Plants throughout the country, more Clark Compressors are in use than any other make.

The Wood River, Ill. plant of Shell Oil Company, Inc., with 7,795 BHP of Clark installations, is a typical example. An unusual feature of this plant is the fact that it is equipped with gas engine-driven, steam engine-driven and electric-driven compressors. In the event of failure of fuel gas, steam or electricity, the plant would not have to shut down completely.

CLARK BROS. CO., INC., OLEAN, NEW YORK

New York • Tulsa, Okla. • Houston, Tex. • Chicago
Boston • Los Angeles • London • Buenos Aires

CLARK COMPRESSORS CUT COSTS

1. Cut fuel costs—Reason: Super 2-Cycle fuel injection.
2. Cut transportation and erection costs—Reasons: Shipped assembled — lighter weight, more easily installed.
3. Cut foundation and floor space costs — Reasons: Compact "Angle" design — inherent balance.
4. Cut maintenance costs — Reason: Extreme mechanical simplicity.

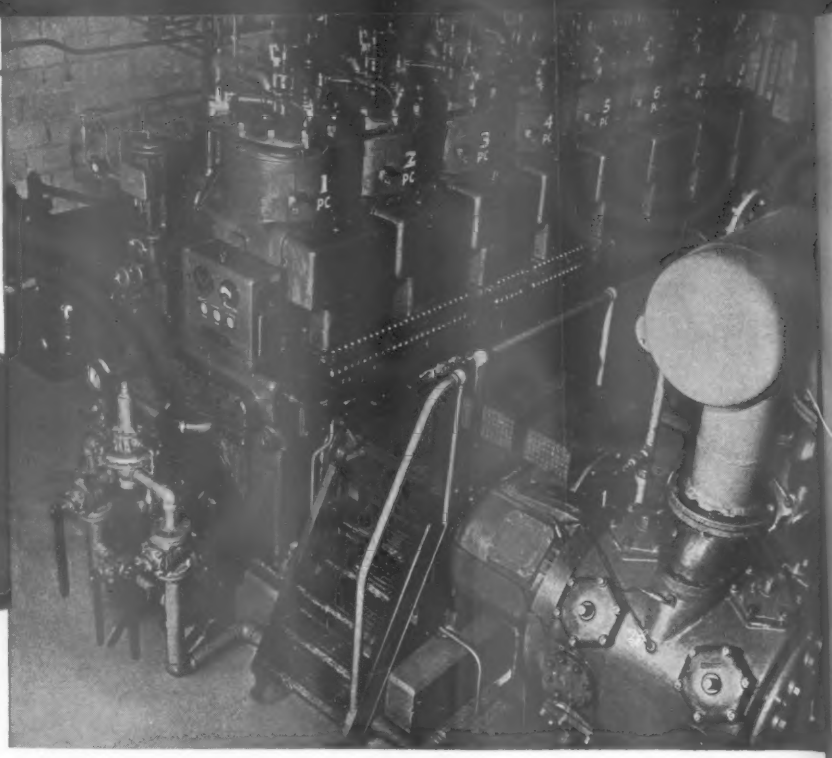
CLARK

ONE OF THE DRESSER INDUSTRIES

SETS THE PACE IN COMPRESSOR PROGRESS

In jet-propulsion laboratory, 1,000 BHP Clark 8-Cyl. "Angle" Compressor supplies compressed air for jet burner.

CLARK COMPRESSORS AT "SHELL" WOOD RIVER ILLINOIS, PLANT



Jet-Propulsion Laboratory Use
Clark 1,000 BHP "Angle" Compresso

Probably the most interesting feature of the Shell Oil Company's plant at Wood River, Ill., is the laboratory for the study of fuels for jet-propulsion aircraft. Little can be told about this installation, for obvious reasons of military secrecy.

To produce a "super-hurricane" stream of hot gas from the jet burner, compressed air is furnished by the Clark Super Charged 8-Cyl. "Angle" Compressor shown above. This is one of many Clark Compressors at the Wood River plant, some of the others being shown on the preceding page.

CLARK BROS. CO., INC. OLEAN, NEW YORK

CLARK SUPER 2 CYCLE COMPRESSORS

"Proving Grounds"

The "Proving Ground" where Wabco Piston Packing Cups were developed . . . and where they are under year-round continuous, gruelling test . . . is 4-ft. 8½-in. wide and hundreds of thousands of miles long! For it was American railroads that created the need for this unusual packing.

When trains started traversing deserts with semi-tropical temperature, and negotiating mountain passes where sub-zero temperatures were encountered, ordinary packing materials couldn't stand the gaff. Westinghouse Air Brake Company's research men tackled the problem of developing a new packing material, that would stand extremes of heat and cold, retain its resilience and sealing properties under all conditions, and combine long life with unfailing dependability. Wabco packing was their answer.

If pneumatic or hydraulic cylinders are used on your products, you can solve your packing problems simply and economically by specifying Wabco. Wabco cups are available for original installation in sizes from ¾-in. to 30-in. for pneumatic cylinders, and from 1 3/16-in. to 7-inch for hydraulic cylinders. Built-in Limited Compression, an important feature, is available in cups from 1-in. to 7½-in. Ask for a bulletin giving dimensional information.

WESTINGHOUSE AIR BRAKE COMPANY

INDUSTRIAL DIVISION

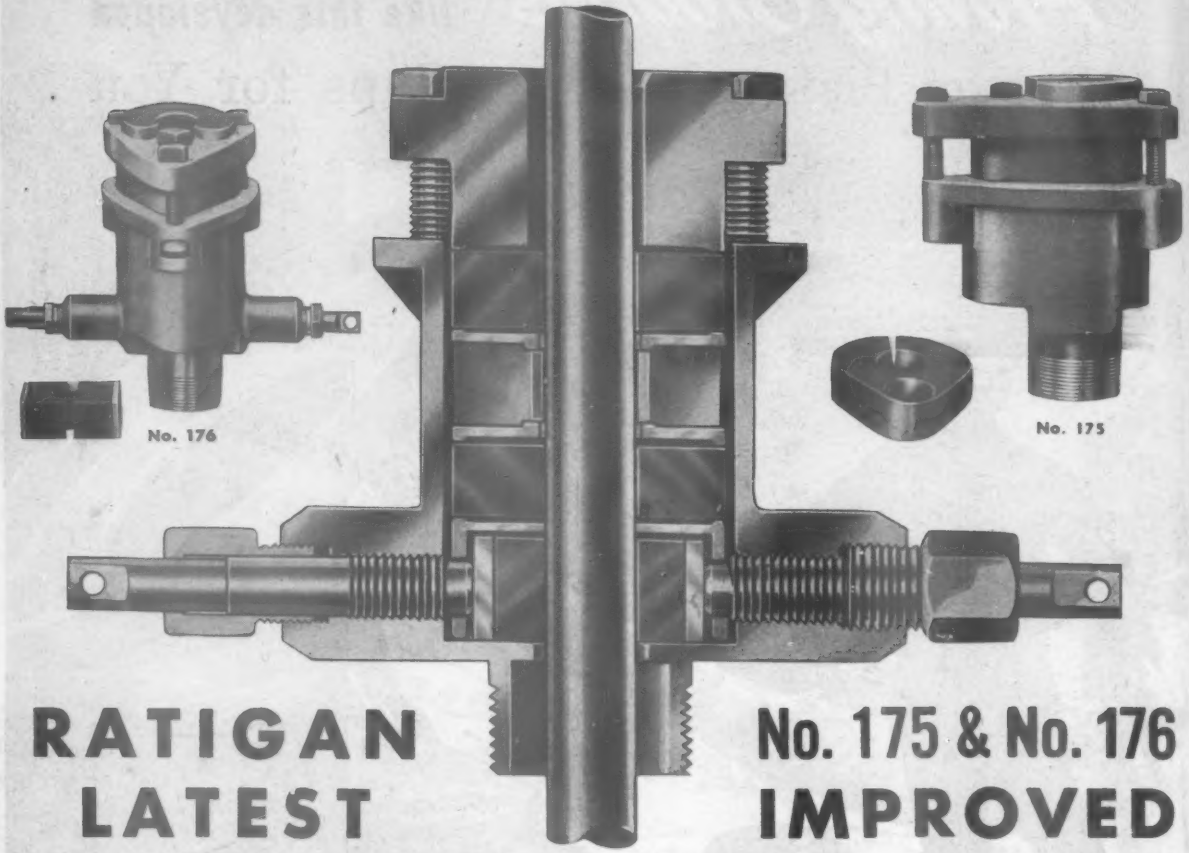
General Offices:
WILMERDING, PA.

WABCO PACKING

COMPRESSORS

PNEUMATIC CONTROLS

The only self-oiling stuffing boxes receiving their lubrication directly from the pumping well.



RATIGAN LATEST No. 175 & No. 176 IMPROVED STUFFING BOXES

Tested to 3,000 Pounds Pressure

Both types of Ratigan Stuffing Boxes are identically the same in design and operation except that the No. 176 has a special shutoff feature. The inside of the box is removable, so that the device has two oil chambers. Another arrangement inside the body keeps both chambers filled with fluid from the well, thus providing continuous self-lubrication without depending on the human element—an important development in stuffing box performance.

The hole in the rubber is the size of the polished rod, while the hole in the metal parts of the body is larger, making the rod self-aligning—another important feature.

The No. 176 has a special shutoff feature, making it possible to shut off while repacking the box. This is accomplished by tightening the screws evenly in the shutoff; but care must be exercised as the screws must be loosened again before the well starts to pump, or the fluid will not get up into the stuffing box.

When the screws are not tight against the rubber, the stuffing box is free to function properly. For a further check on the fluid coming up through the bypass, the pumper may loosen the plug in the cap a little, and if the bypass is free the oil will flow immediately. If the oil does not come through, the screws in the shutoff are too tight.

When repacking Ratigan Stuffing Boxes, both rubbers must be removed. Instructions for installing are supplied to oil companies and supply stores on request, and are attached to all foreign shipments. When ordering, specify size and type of thread, and size of polished rod.

All Ratigan products are shown and described on pages 2507-2526 of the 1943-44 edition of the Composite Catalog.

Manufactured by

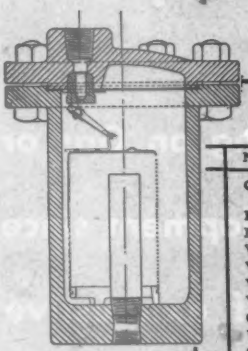
J. P. RATIGAN

1213 Santa Fe Avenue. Los Angeles 21, California.

Ratigan Products Are Sold Through Leading Supply Stores.

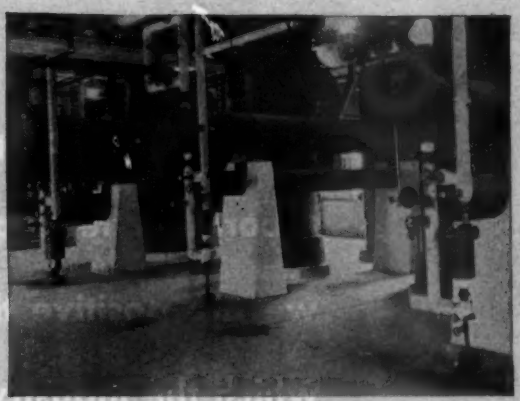
FORGED STEEL STEAM TRAPS...for

HIGH PRESSURES
"ALL STEEL" INSTALLATIONS
MAXIMUM SAFETY



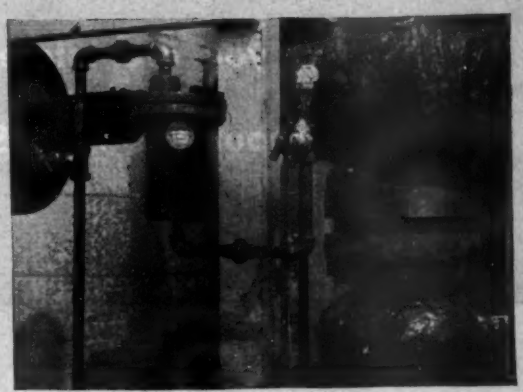
LIST OF MATERIAL
(TRAPS NO. 312-515)

NAME OF PART	MATERIAL
Cap and Body	Die Forgings (S.A.E. 1030) 79,000 lbs. Tensile Strength
Bolts	Super Temp. 149,000 lbs. Tensile
Nuts	Hex. Semi-Finish (S.A.E. 1030)
Valve	Chrome Steel (Heat Treated)
Valve Retainer	18-8 Stainless Steel
Valve Lever	18-8 Stainless Steel
Valve Guide Plate	18-8 Stainless Steel
Guide Plate Screw	18-8 Stainless Steel
Valve Seat	Chrome Steel (Heat Treated)
Gasket	Compressed Asbestos Graphited or Soft Iron
Bucket Assembly	18-8 Stainless Steel
Inlet Tube	Wrought Iron



As high pressure power plants were developed, Armstrong concurrently developed forged steel inverted bucket steam traps for pressures above 250 lbs., finally arriving at traps capable of safely withstanding 2400 psi. In recent years, however, the advantages of these traps have not been confined to high pressures, the trend in power plants and refineries being to use steel fittings and steel traps widely for lower pressures, often with welded joints. This practice eliminates any danger of fracture due to explosions or fires. Armstrong Steel traps are the last word in quality and durability.

When engineering steel installations, be sure to have complete data on Armstrong Forged Steel traps. Ask for a copy of the ARMSTRONG STEAM TRAP BOOK.



ARMSTRONG MACHINE WORKS
868 Maple Street • Three Rivers, Michigan

ARMSTRONG

Here's a secret we've

NOW IT CAN

The story about the New Superior

A new Superior Drilling Engine operating on Gas or Butane has been in the process of development since 1941. After completing 2000 hours of exhaustive laboratory tests and eight tough months in the field, we are positive that we have the drilling engine for which the industry has been waiting.

If you are interested in learning the complete facts about this new Superior drilling engine, we suggest

THE NATIONAL SUPPLY COMPANY

been keeping since 1941

BE TOLD!

6G-510 Drilling Engine

you clip and return the coupon in this ad as soon as possible. Already many signs point to a demand that will tax our manufacturing facilities to the limit.

THE NATIONAL SUPPLY COMPANY, Box 899, Toledo 1, Ohio
I would like additional information regarding the new Superior 6G-510 Drilling Engine.

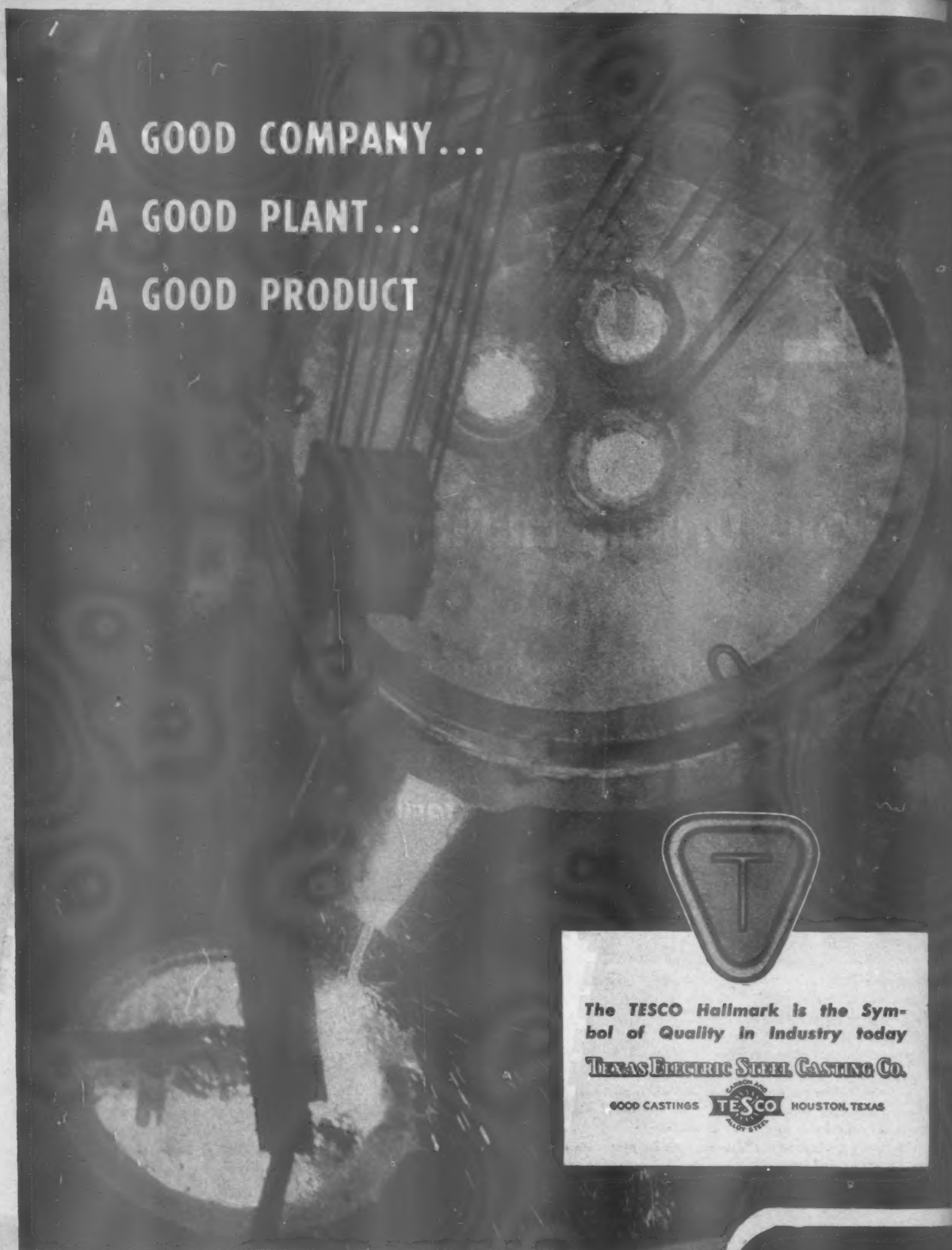
MAIL TO _____

TITLE _____

COMPANY _____

ADDRESS _____

General Sales Offices: Toledo, Ohio: Division Offices: Denver; Ft. Worth; Pittsburgh; Tulsa; Torrance.
Export: The National Supply Corporation, 30 Rockefeller Plaza, New York, N. Y., U. S. A.;
River Plate House, 12 South Place, London, E. C. 2.


A GOOD COMPANY...
A GOOD PLANT...
A GOOD PRODUCT
The TESCO Hallmark is the Symbol of Quality in Industry today
TEXAS ELECTRIC STEEL CASTING CO.
GOOD CASTINGS
TESCO
HOUSTON, TEXAS
TESCO
BETTER STEEL
FOR
MODERN INDUSTRY

Sterling
MEANS QUALITY

We Have
THE RIGHT CONNECTIONS

When you 'gasket-up' your refinery with Sterling engineered gaskets, you have made the right connections to steer clear of the hissing, coughing leaks that mean trouble and breed danger.

Our broad experience combined with field and laboratory research has led to the design and manufacture of gaskets to meet every refinery requirement. For boiler manholes, handholes and tube caps, use type ST STERLTALLIC gaskets made of spirally wound plies of preformed strip metal and asbestos. Available in all shapes and sizes. For pressure vessels, towers and exchangers, we are prepared to fabricate Armco Iron double shell, asbestos filled gaskets of any size and pattern to withstand high temperatures, pressures, and your commodity.

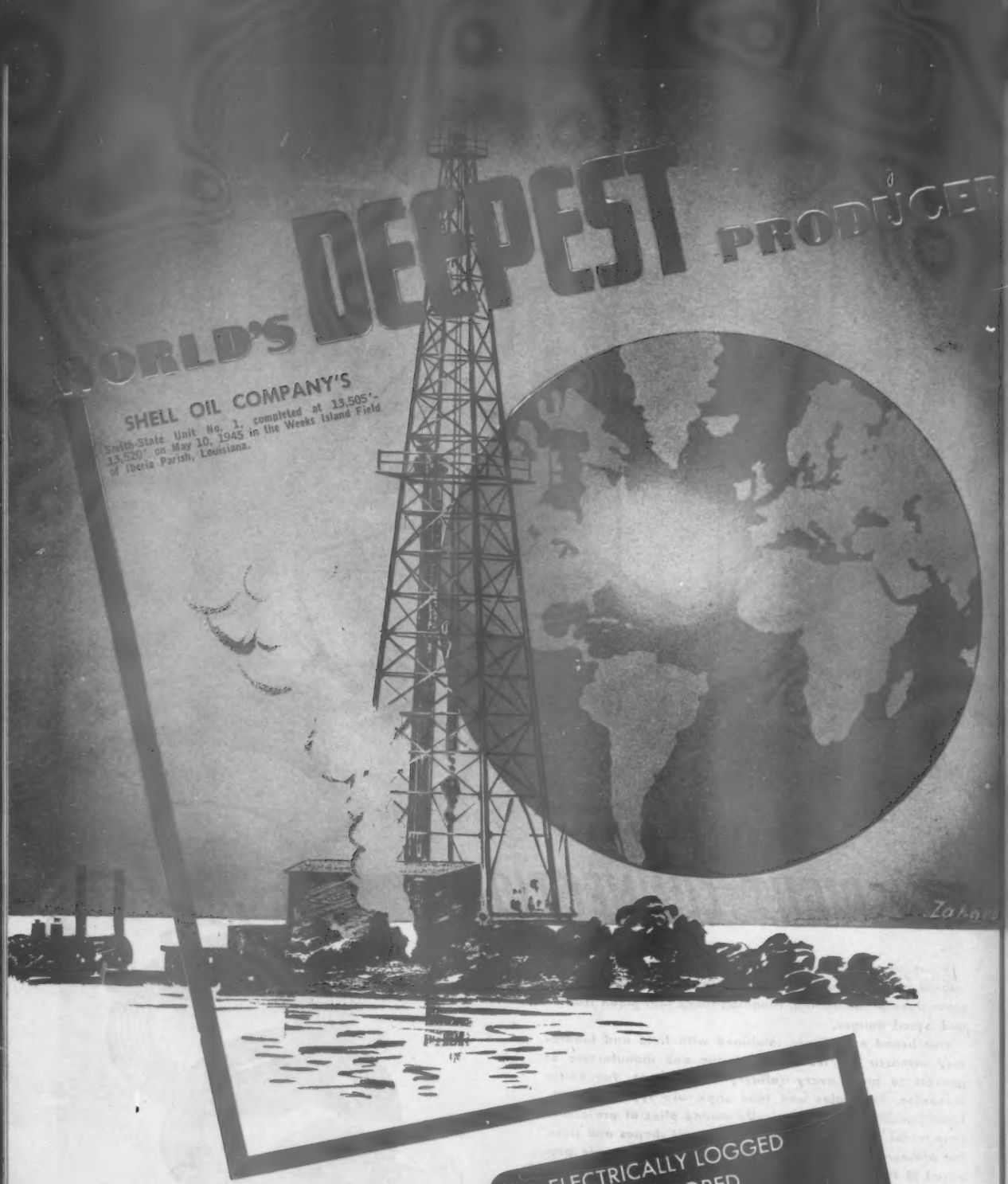
DOUBLE CORRUGATED asbestos filled Spun Metallic Gaskets are furnished in all sizes and of various metals. DOUBLE SHELL asbestos filled gaskets are available in all sizes, made from Steel, Armco Iron, Monel, Stainless Steel or Copper.

Sterling fabrication facilities, engineering skill and laboratory research assure you THE RIGHT CONNECTION every time, regardless of your refinery gasket problem.

STERLING PACKING & GASKET CO.

(Incorporated)

Houston, Texas

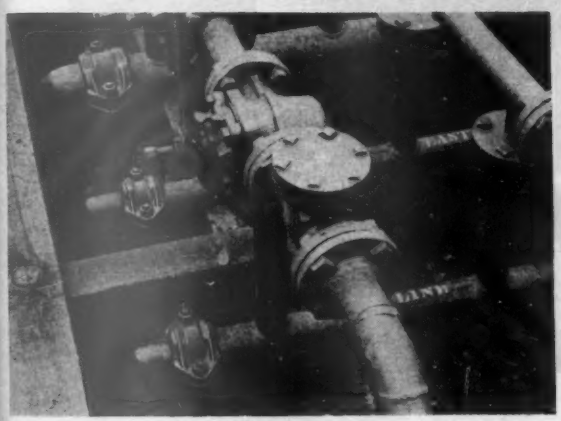

WORLD'S DEEPEST PRODUCER
SHELL OIL COMPANY'S
Smith-State Unit No. 1, completed at 13,505'-13,520' on May 10, 1945 in the Weeks Island Field of Iberia Parish, Louisiana.

ELECTRICALLY LOGGED
SIDE WALL CORED
TEMPERATURE SURVEYED
DIRECTIONALLY SURVEYED
DIP METERED
GUN PERFORATED

SCHLUMBERGER ...ALL THE WAY!

SCHLUMBERGER WELL SURVEYING CORPORATION

HOUSTON, TEXAS



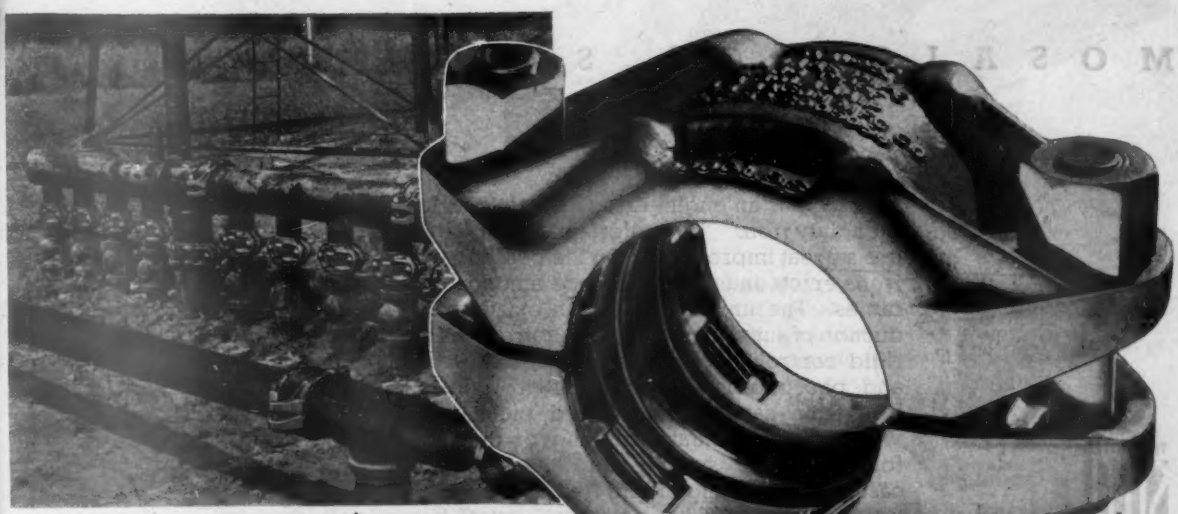
G-B

ROLAGRIPS

have Multiple Advantages for Manifold Connections

On manifold connections or any other connection work G-B Rolagrips are particularly adaptable. Rolagrips are quickly installed on plain pipe ends without special tools, grooving, threads or special ends. Their simple installation makes connection work faster and more economical.

Gripping with bulldog tenacity, Rolagrip Couplings provide positive, leakproof connections yet allow considerable tolerances in accuracy of pipe joining and in angular misalignment. Rolagrips require no anchorage. They are adaptable to new or used plain end pipe, and can be quickly removed and used many times over.... And for high pressure lines up to 2000 pounds Supertype Rolagrips are the answer.



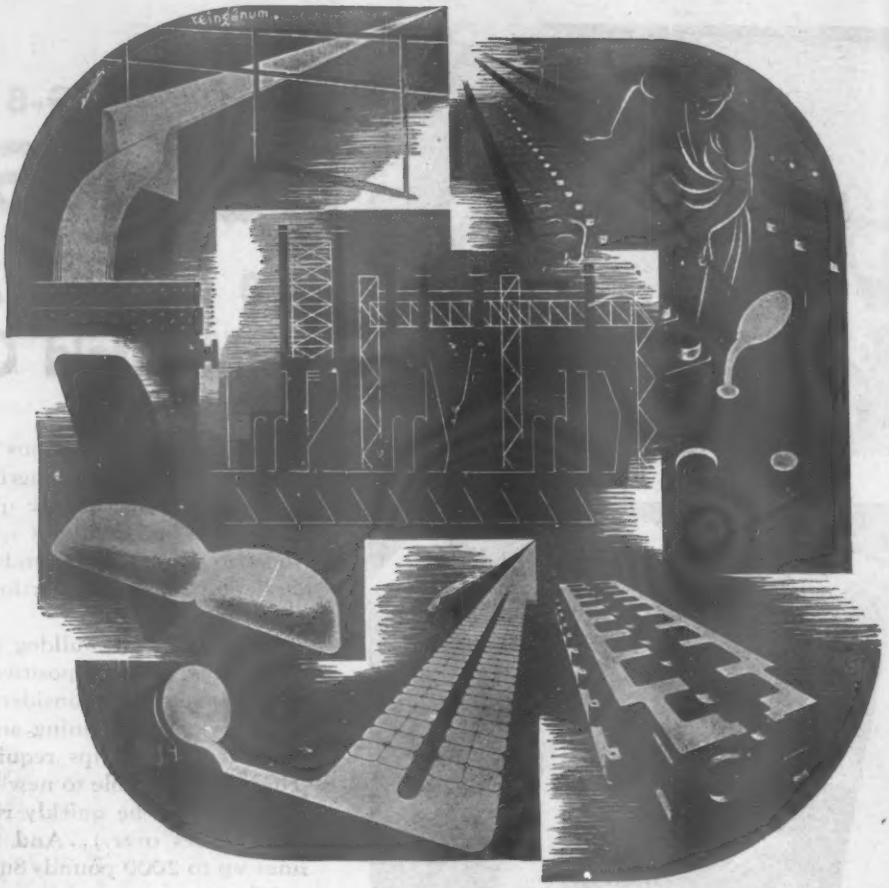
G-B MFG. CO.

ESTABLISHED 1898

GUSTIN-BACON MFG. COMPANY

KANSAS CITY 7, MISSOURI

New York · Philadelphia · Chicago · Tulsa · Houston · Fort Worth · San Francisco



Design by Victor Reinganum

MOSAICS OF STEEL

NUMBER ONE

Cast iron as an engineering material has found fresh favour with the advent of high duty irons. The materials, in strength, soundness and physical properties, are a great improvement on the best cast iron of a generation ago. Workington irons enjoy unusual confidence amongst foundry men, particularly for special duties. The unique conditions existing at Workington contribute to the production of superior irons. The pure hematite ores are mined locally and, with rigid control throughout all processes, result in a product having a low sulphur and phosphorus content. All iron manufactured is machine cast and is free from sand and awkward pieces. Refined irons are also made from virgin metal without remelting or the addition of scrap. They are therefore eminently suitable for the production of malleable iron and special castings. Workington pig iron is used as the basis of the finest acid steels.

THE UNITED STEEL COMPANIES LTD

THE UNITED STEEL COMPANIES LIMITED

17 WESTBOURNE ROAD • SHEFFIELD 10 • ENGLAND

STEEL, PEECH & TOZER, SHEFFIELD
SAMUEL FOX & CO. LTD., SHEFFIELD
UNITED STRIP & BAR MILLS, SHEFFIELD
APPLEBY-FRODINGHAM STEEL CO. LTD., SCUNTHORPE
WORKINGTON IRON & STEEL CO., WORKINGTON
UNITED COKE & CHEMICALS CO. LTD., CUMBERLAND
THE ROTHERVALE COLLIERIES, TREETON
THE SHEFFIELD COAL CO. LTD., TREETON
THOS. BUTLIN & CO., WELLINGBOROUGH

USP. 46

"Riding Comfort"

FOR INDUSTRIAL MACHINES

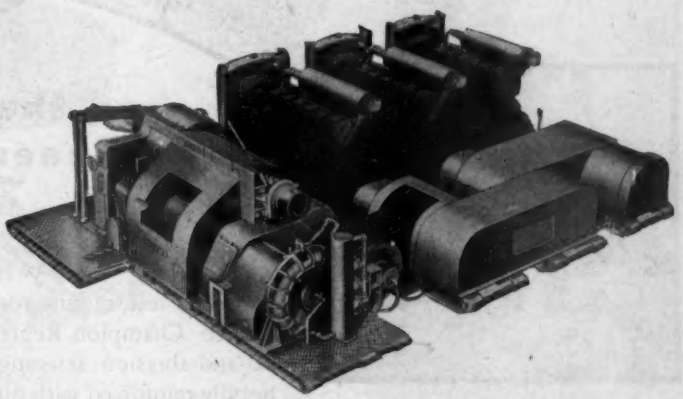
Smooth operation, and freedom from shocks and vibration, are just as important in your heavy-duty machines as they are in your motor vehicles.

Now, for the first time, you can give your machines true air-cushioned "riding comfort" with the Fawick Airflex Clutch.

This new clutch controls power and torque through a cushion of air and rubber. Regulated inflation gives you clutch engagement as light or as firm as the job demands. There are no springs, arms or toggles, no adjustments to make, no lubrication required. Misalignment is corrected automatically. Maintenance costs are usually low. Both drive and driven members have new nonmetallic safety and protection.

Our experienced engineering department will gladly give you recommendations for your machines.

THE FAWICK AIRFLEX CLUTCH provides air-cushion clutch action because it matches today's fine motor vehicle tires in quality of material and excellence of workmanship — the result of the great technical advances made by America's Rubber Industry.



Fawick Airflex Clutches have introduced new economy of operation in modern drilling equipment. There is complete protection against shocks and vibration, smooth starts and stops, and lower maintenance costs.

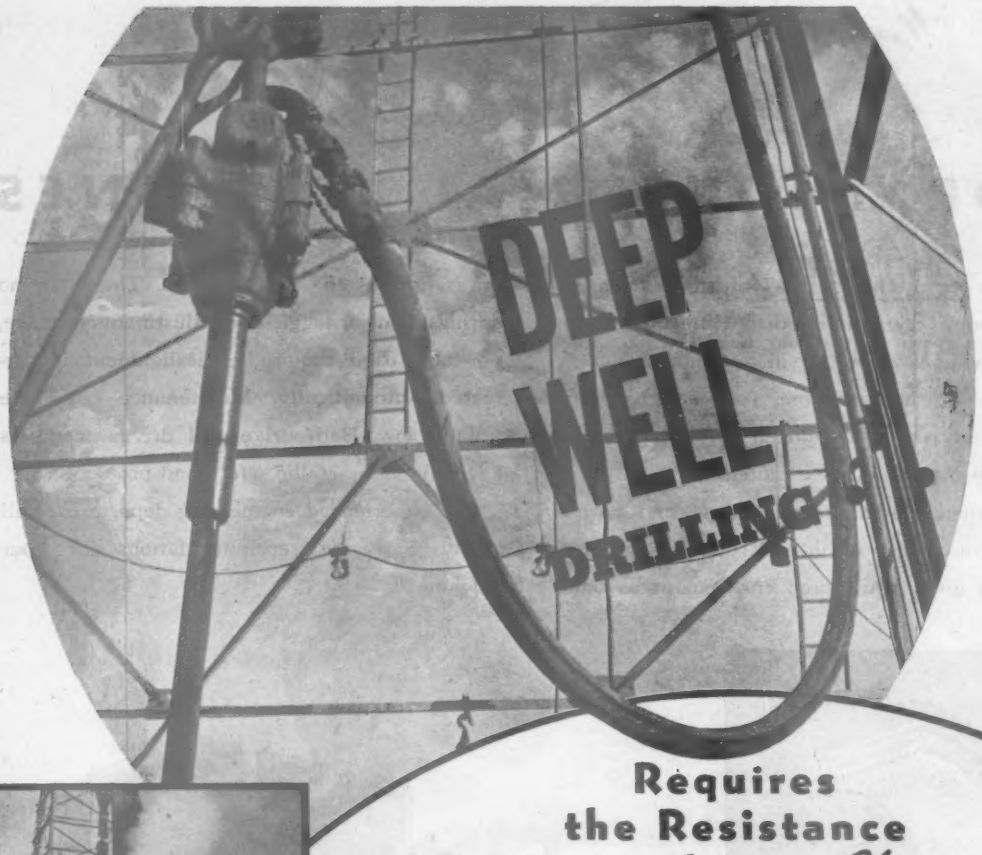
ARMY E NAVY

FAWICK AIRFLEX COMPANY, INC. • **9919 Clinton Rd. Cleveland 11, Ohio**

In Canada, **Renold-Coventry Ltd., Montreal, Toronto, Vancouver** • *In Britain,* **Crofts Engineers, Ltd., Bradford, England**

FAWICK *Airflex* CLUTCH

POWER CONTROLLED BY AIR



Requires the Resistance Engineered into *Champion Reprene Rotary Hose*

HIGH DRILLING pressures, on wells of 10,000 to 15,000 feet, require rotary drilling hose specifically designed for the service. Champion Reprene Type C Rotary Hose is constructed with oil-and-abrasion resisting synthetic rubber compounds throughout, heavily reinforced with plies of heavy fabric, multiple layers of stranded wire, and an additional winding of heavy round wire. This rugged structure is engineered to withstand 5,000 pounds test pressure per square inch and will give long service on deep well installations. Consult your Republic Distributor on Champion Reprene Rotary Hose.

MID-CONTINENT DISTRIBUTORS

The Bovaird Supply Co.
Tulsa, Okla.

Jones & Laughlin Supply Co.
Tulsa, Okla.

WE ARE PARTICIPANTS IN THE OWNERSHIP AND OPERATION OF NATIONAL SYNTHETIC RUBBER CORPORATION

REPUBLIC RUBBER

DIVISION

LEE RUBBER & TIRE CORPORATION

YOUNGSTOWN 1, OHIO

REPUBLIC INDUSTRIAL PRODUCTS
YOUNGSTOWN O

LEE DELUXE TIRES AND TUBES
CONSHOHOCKEN PA

It's greatest critics...

..ARE THE MEN WHO MADE IT!

● From its very beginning, the molding . . . the metal . . . its pouring and finishing—men long experienced in all phases of foundry work carefully nurse, guard and watch over every Sivyer casting.

These men insist upon castings as perfect as it is possible to make them. For only by having them this way will they uphold the high standards of Sivyer steel castings . . . entitle them to carry the Sivyer diamond ◈ —the mark worth looking for.

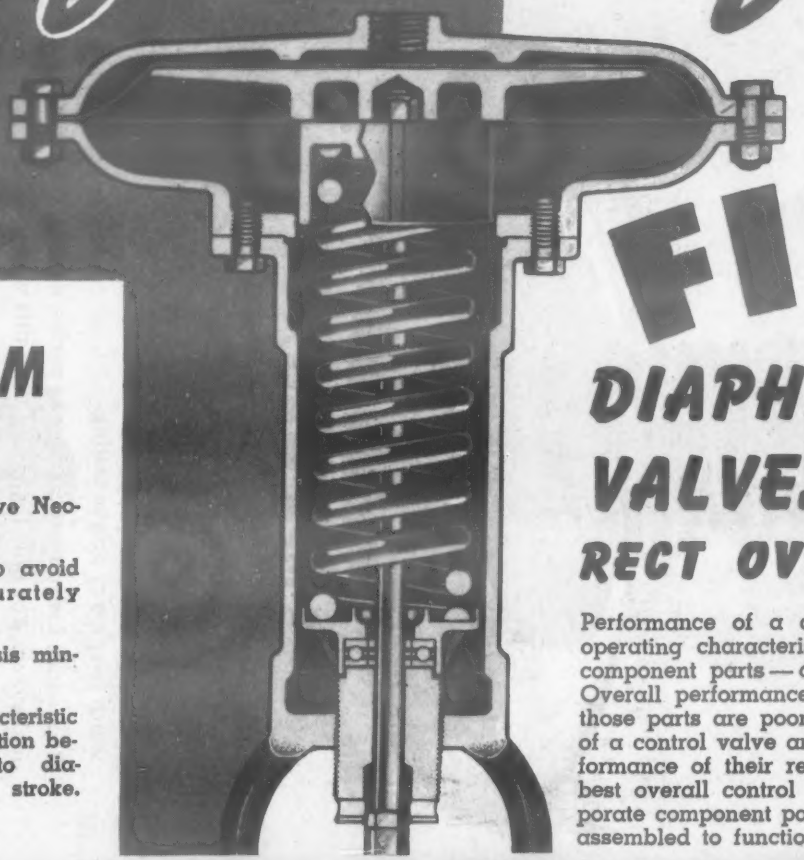
The next time you order steel castings, try Sivyer.

ARMY E NAVY

SIVYER STEEL CASTING COMPANY

MILWAUKEE S CHICAGO S

Preferred Performance!



DIAPHRAGM MOTOR

(1) Large area sensitive Neoprene diaphragms.

(2) Spring designed to avoid over stress — accurately calibrated.

(3) Friction or hysteresis minimized.

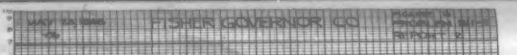
(4) Performance characteristic — straight line relation between pressure to diaphragm vs. stem stroke.

FISHER

DIAPHRAGM CONTROL VALVES THE RESULT OF CORRECT OVERALL ENGINEERING

Performance of a diaphragm control valve is dependent on the operating characteristics, individually and collectively, of its three component parts — *diaphragm motor, inner valve* and *valve body*. Overall performance will not be satisfactory if any one or all of those parts are poorly designed. In other words the working parts of a control valve are dependent on each other for the efficient performance of their respective functions. Resultantly, to produce the best overall control characteristics, a diaphragm valve must incorporate component parts that are correctly engineered, machined and assembled to function as a complete control unit.

INNER VALVE



assembled to function as a complete control unit.

INNER VALVE

(1) Proper characteristic by correct contour designs and by close control of port contour machining.

(2) Selected materials for resistance to corrosion, erosion and galling.

(3) Skirt guided — top and bottom guided (both V-port and formed plunger) — conventional throttling or percentage type characteristics.

(4) Stems reversible in field.

VALVE BODY

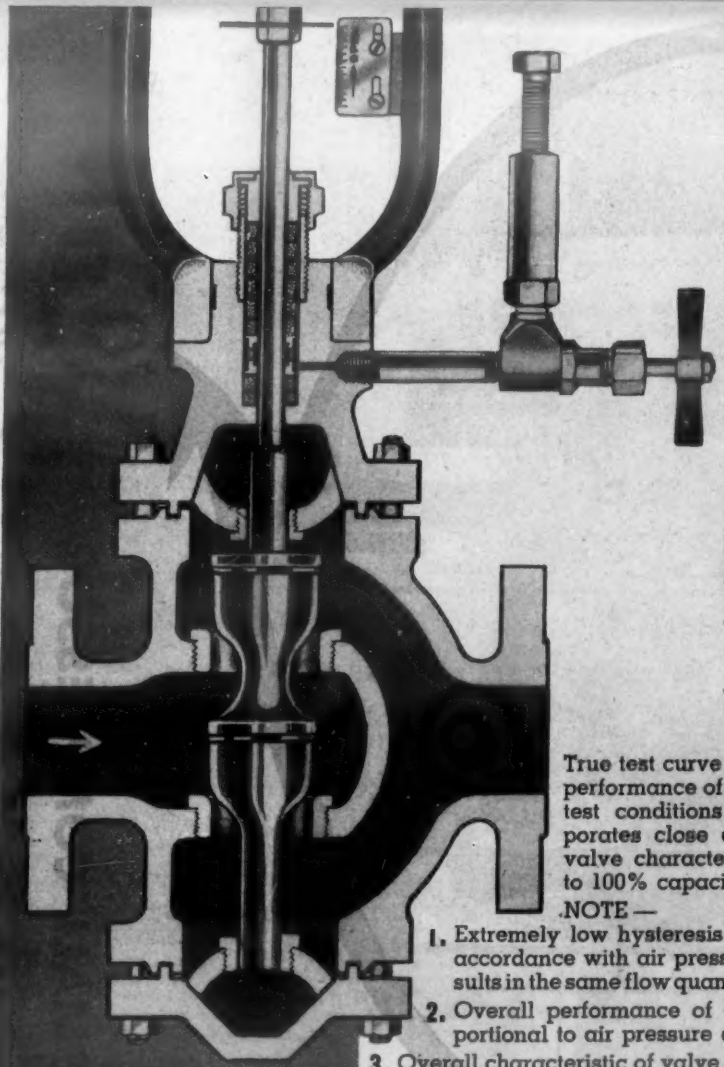
(1) Large flow passages to minimize flow friction losses.

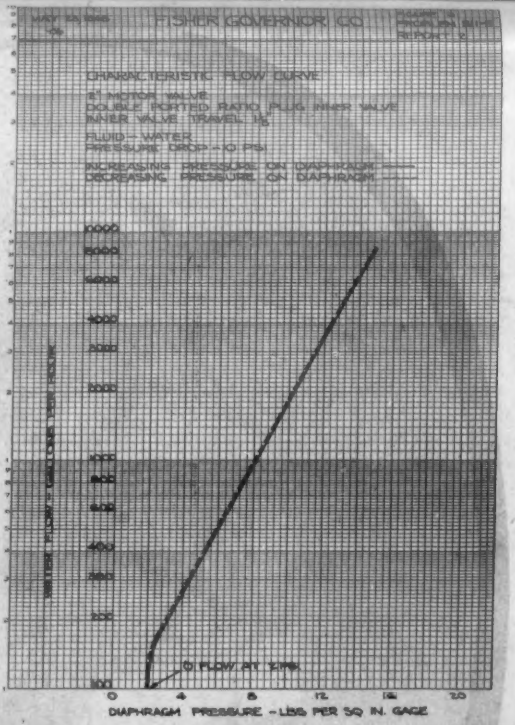
(2) Full size port openings capable of developing full line area.

(3) Distance between ports designed to avoid inner valve interference to flow.

(4) Wall section built to ASA fittings standard — iron bodies 250 lbs. — steel bodies 600 lbs. regardless of end fittings.

(5) Deep packing stuffing box designed for molded packing to minimize leakage — lubricated to minimize friction.




FISHER GOVERNOR CO.
CHARACTERISTIC FLOW CURVE
8" MOTOR VALVE
DOUBLE PORTED RATIO PLUG INNER VALVE
INNER VALVE TRAVEL 1"
FLUID — WATER
PRESSURE DROP — 10 PSI
INCREASING PRESSURE ON DIAPHRAGM
DECREASING PRESSURE ON DIAPHRAGM
DIAPHRAGM PRESSURE — LBS. PER SQ. IN. GAGE

True test curve from our engineering files, illustrating actual performance of diaphragm motor valve illustrated and under test conditions specified. Inner valve construction incorporates close clearances — clearance flow is 1.9%. Flow valve characteristic is of percentage flow type from 1.9% to 100% capacity.

NOTE —

1. Extremely low hysteresis — accurate positioning of the inner valve in accordance with air pressure changes on the diaphragm — always results in the same flow quantity for any given specific air loading pressure.
2. Overall performance of the valve is uniform with and directly proportional to air pressure change on the diaphragm.
3. Overall characteristic of valve gives proper performance over wide changes of flow — permits handling wide range of pressure drop and flow conditions.

FISHER GOVERNOR COMPANY

278 Fisher Building • MARSHALLTOWN, IOWA

ONE SMALL COMPRESSOR

TEN WELLS

TEN NIXON GAS LIFTS

Lifting Costs Cut in Half.

International Distributors: Nixon Gas Lifts — Regulators

WILSON SUPPLY COMPANY

1412 MAURY ST., HOUSTON, TEXAS

SALES OFFICES: Tulsa, Oklahoma; Dallas and San Antonio, Texas. LOS ANGELES: Western Pressure Control, 5700 Santa Fe Ave. TRINIDAD, B.W.I.: Neal Massey Eng. Corp.

BRANCH STORES: TEXAS—Kilgore, Beaumont, Barbers Hill, Bay City, Monahans, Alice, Victoria, Corpus Christi. LOUISIANA—Lake Charles, New Iberia, Harvey, Shreveport. ARKANSAS—Magnolia. MISSISSIPPI—Natchez.

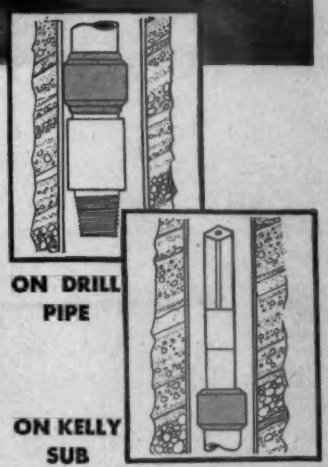
CASING PROTECTORS • STABILIZERS • PIPE WIPERS • WIRE LINE GUIDES • WIRE LINE WIPERS • KELLY WIPERS
KELLY SUB PROTECTORS • MUD GUNS • MUD GUN NOZZLES • SWIVEL BAIL BUMPERS • DEAD LINE STABILIZERS
TRAVELING BLOCK BUMPERS • TUBING PROTECTORS • SUCKER ROD WIPERS • TUBING WIPERS

INSTALLATION COMPLETED—*PROTECTORS 100%*

Yes, a 100% installation of Patterson-Ballagh casing protectors is gilt edge, 100% security.

To be *effective,* a Patterson-Ballagh Protector *must* be used at *each* tool joint. Even *one* unprotected joint (which means a Protector missing or worn below the tool joint diameter) may mean water intrusion five years from today or sooner. Other advantages are: Straighter hole; increased speed in drilling; reduction in twist-offs; added life to drill pipe and tool joints; reduction in power.

Guarantee full protection by specifying a Patterson-Ballagh Protector at each joint. Now *lipped* to streamline the drill pipe.



ON DRILL PIPE

ON KELLY SUB

"Best Bet Yet"

PATTERSON-BALLAGH

LOS ANGELES 1 • HOUSTON 10 • NEW YORK 6

PATTERSON-BALLAGH

PROTECTORS

Now Made of PBX Synthetic Rubber—Oil and Weather Resistant

FOR THE LIFE OF THE LEASE THEY'LL CONTINUE TO SERVE

• Thorough separation of crude runs from a high pressure Mid-Continent well.

This tank battery is the property of one of hundreds of quality-minded producers who know, from long experience, that the best time to solve a lease storage problem is before it arises. He's doing it by specifying Parkersburg Bolted Steel Tanks, the quality and workmanship in which assure owners that they can get them on the lease and forget storage troubles. Try where you may, you can't match the dependability Parkersburg builds into these tanks.

By that same token, producers specify Parkersburg Separators to handle flowing well production to stock tanks. Behind both of these quality-built products are four dozen years experience in research, design and fabrication of dependable oil industry equipment.

Your Parkersburg Representative will welcome a call from you.

THE PARKERSBURG RIG & REEL CO.

PARKERSBURG & OCS PRODUCTS

GENERAL OFFICES, PARKERSBURG, W. VA.

Plants at Parkersburg, W. Va., Coffeyville, Kan.

District Offices

Dallas - Houston - Los Angeles - Tulsa

New York

PARKERSBURG

When you're talking SALES . . . consider A NATIONAL SHOW for your product for $37,200 a year

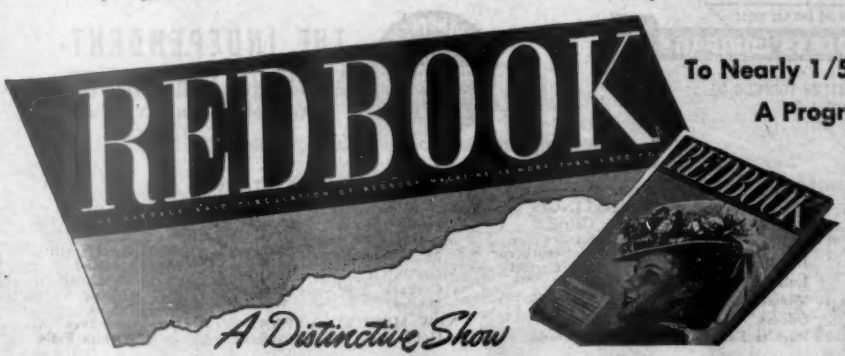
"TEMPER forethought with hindsight," counsels many an automotive man. "Base post-war planning on pre-war experience, and profit by conclusions," they explain.

Yes — even with the pent-up demand for post-war cars, friends in the industry tell us that the job is going to call for plenty of hard selling.

That's why we suggest REDBOOK'S NATIONAL SHOW FOR ONLY $37,200 A YEAR COMPLETE. Here is a cohesive audience of 1,500,000 families who happen to like fine fiction. They are a literate, *thinking* group who read and *understand* printed advertising. They are a group, too, who want — and *can afford to buy* — good cars.

- *Redbook* buyers pay 25c an issue — *buy* to *read.*
- High editorial percentage helps create cover-to-cover interest.
- Monthly issues guarantee longer life.
- Reader Research assures constant appeal.
- So consider a NATIONAL SHOW FOR YOUR PRODUCT FOR $37,200 A YEAR COMPLETE WITH A FULL PAGE IN EVERY ISSUE OF REDBOOK.

Although Redbook space is sold out at the moment, smart advertisers are making plans for the future *today!*



To Nearly 1/5 of America —

A Program of proven Sales Power

Redbook, Cosmopolitan, and American, THE 6 MILLION GROUP, reach nearly six million families with less than 15% duplication — approximately one out of every 5 in the United States. *And a full page in every issue of all 3 magazines costs only $160,000 a year.*

2 Vital Services COMBINE TO PROVIDE BROADER SERVICE TO YOU!

ACIDIZING

SHOOTING

Now you have the advantage of highly *specialized* Shooting Service, and Acidizing Service, operating under one management, for the purpose of providing a more thorough means to get the maximum production and recovery from your oil and gas wells. Just get in touch with any of the service stations listed below for *Specialized* Shooting or Acidizing Service.

CHEMICAL TREATMENT OF OIL AND GAS WELLS
THE CHEMICAL PROCESS COMPANY
DIVISION OF
THE INDEPENDENT-EASTERN TORPEDO CO.
BRECKENRIDGE, TEXAS

THE INDEPENDENT-EASTERN TORPEDO CO.
MAIN OFFICE: FINDLAY, OHIO

ACIDIZING SERVICE STATIONS

KANSAS
Great Bend
Hugoton
Russell
Wichita

LOUISIANA
Shreveport

OKLAHOMA
Guymon
Seminole
Tulsa

NEW MEXICO
Hobbs

TEXAS
Borger
Breckenridge
Fort Worth
Holliday
Levelland
Luling
Midland
Odessa
Wichita Falls

ILLINOIS
Carmi
Casey
McLeansboro
Mt. Carmel
Salem
St. Elmo

KANSAS
Eldorado

SHOOTING SERVICE STATIONS

KENTUCKY
Henderson

MICHIGAN
Mt. Pleasant

MONTANA
Cutbank
Shelby

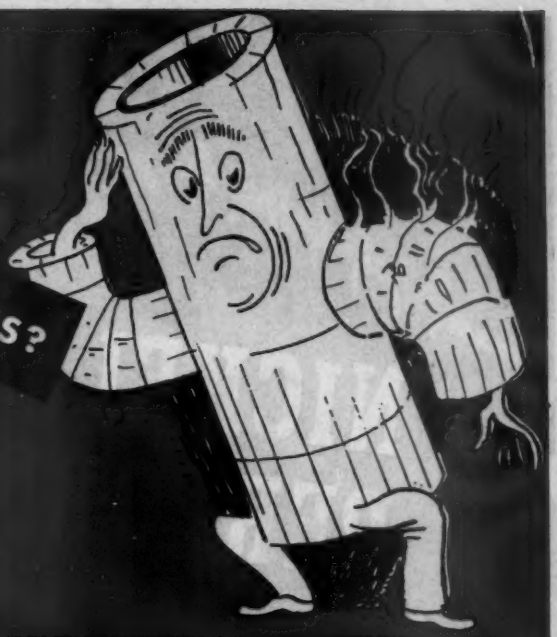
NEW MEXICO
Hobbs

OKLAHOMA
Nowata
Oklahoma City
Tulsa

OHIO
Findlay
Wooster

TEXAS
Abilene
Big Spring
Borger
Breckenridge
Fort Worth
Midland
Monahans
Odessa
Pampa
Seagraves
Wichita Falls

COMING OUT AT THE ELBOWS?



SIMPLY APPLY UNIBESTOS

it's simple to apply!

Unibestos, being sectional for virtually all size pipes, greatly simplifies the application of insulation to bends and elbows. You simply mitre sectional Unibestos to fit—the fibrous nature of the material used in Unibestos (amosite) makes for a more perfect seal; eliminates much of the need for filling in with plastic —requires only a *surface* application to finish it off in a neat, clean and efficient job.

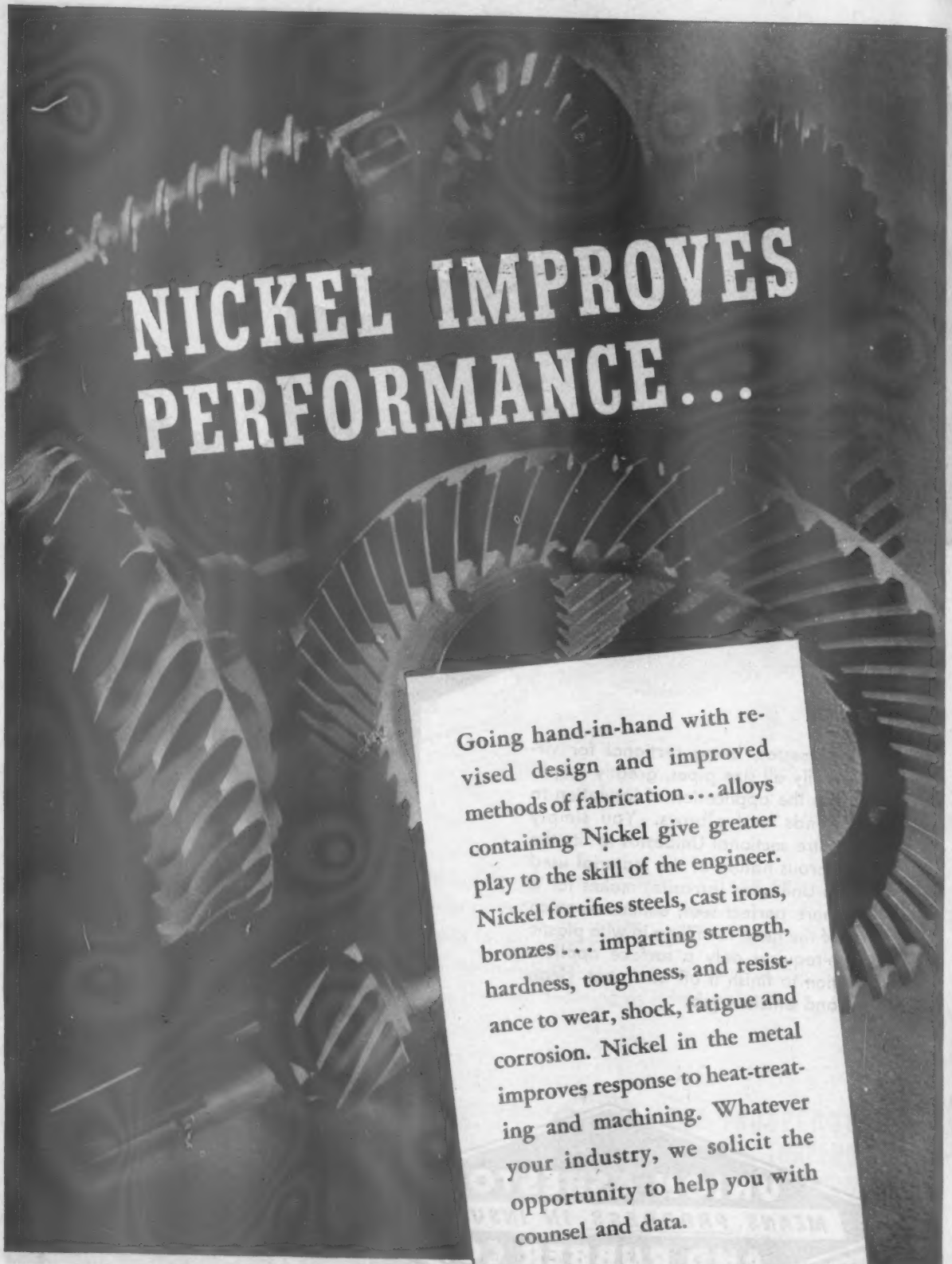
UNION ASBESTOS

MEANS PROGRESS IN INSULATION

AND RUBBER CO.

COPYRIGHT 1944
UNION ASBESTOS AND RUBBER CO

PLANTS: 1821 S. 54th Ave., CICERO, ILL. • PATERSON, N. J. • BLUE ISLAND, ILL.
OFFICES: CHICAGO • CICERO, ILL. • NEW YORK • SAN FRANCISCO • PATERSON, N. J.



Going hand-in-hand with revised design and improved methods of fabrication... alloys containing Nickel give greater play to the skill of the engineer. Nickel fortifies steels, cast irons, bronzes . . . imparting strength, hardness, toughness, and resistance to wear, shock, fatigue and corrosion. Nickel in the metal improves response to heat-treating and machining. Whatever your industry, we solicit the opportunity to help you with counsel and data.

THE INTERNATIONAL NICKEL COMPANY, INC. 67 WALL STREET NEW YORK 5, N. Y.

ALL-GREEN WIRE ROPE IS TRU·LAY PREFORMED I.P.S.*

EXCLUSIVE NEW GREEN LUBRICANT LENGTHENS LIFE OF THIS SUPERIOR ROPE

THE WORLD'S BEST ROPE MADE STILL BETTER

● Hundreds of field tests, confirmed by scores of laboratory tests, prove this new green lubricant has greater adherence with the result that the wires it covers wear longer, give increased service. So now, every strand of **TRU·LAY** Preformed made of Improved Plow Steel* is literally "stuffed" with this superior lubricant.

Distributors in all important oil field centers

ARMY E NAVY

Wilkes-Barre, Pa., Chicago, Denver, Houston, Los Angeles, San Francisco, Emlenton, Pa., Bridgeport, Conn.

ACCO

TRADE MARK

AMERICAN CABLE DIVISION
AMERICAN CHAIN & CABLE

In Business for Your Safety

Today's trend toward deeper drilling exemplifies the Oil Industry's determination to intensify exploration efforts in the future. Tomorrow's problems offer a challenge and an opportunity for Hughes Tools to prove their superiority through performance.

For thirty-five years, Hughes Tool Company has successfully anticipated advancing requirements . . . your assurance that tomorrow, as today, Hughes Tools will be Standard of the Industry.

Hughes
TOOL COMPANY
HOUSTON, TEXAS